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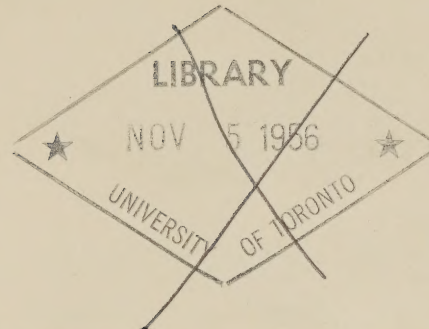
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# THE INTER-INDUSTRY FLOW OF GOODS AND SERVICES, CANADA

1949

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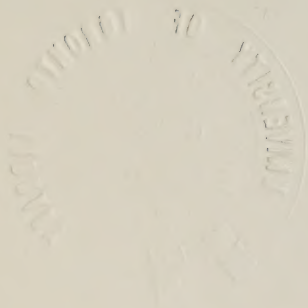
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## PREFACE

This report presents the results of an experimental study of the inter-industry flow of goods and services in Canada for the year 1949. The primary reason for constructing this set of inter-industry accounts was to bring together, in an integrated framework, industrial and other economic statistics collected by the Dominion Bureau of Statistics in order to draw attention to possible inconsistencies in classification and to possible gaps or errors in the data. The adoption of standard classification systems provides the backbone of a good statistical system. To ensure, however, that classifications are being uniformly implemented and to ensure that the classifications are analytically useful, statistics based on them should be integrated in some suitable framework. A table showing the inter-industry flow of goods and services appeared to be ideally suited for the task of integrating industry and commodity statistics.

The table may be regarded as an extension of the National Accounts in that it provides the industrial detail which underlie the Accounts. This detail may be used to further the analysis of the determinants of the national income. As far as possible National Accounts' concepts have been used in this study and, where different estimation procedures were used, the figures in the inter-industry flow table have been adjusted to add to the published National Accounts' totals.

Despite the fact that some of the detailed estimates are based on judgment or tenuous assumptions (as is explained in the Appendix), it was agreed that the overall picture of the economy which the table gives justifies its publication. The table is essentially an experiment and will be studied at greater length before another project of this type is undertaken.

This reference paper was prepared in the Special Projects Section of the Research and Development Division of the Bureau with the assistance of members of other sections of the Division. A number of Bureau Divisions have also contributed to the study. The basic figures for much of the table were prepared in the Industry and Merchandising Division. Other divisions which co-operated in supplying data and estimates were the Agriculture, Education, General Assignments, Health and Welfare, International Trade, Labour and Prices, and Public Finance and Transportation Divisions. The advice and assistance of other government departments and agencies are also gratefully acknowledged. The project was under the direction of Mr. J.A. Sawyer, Chief of the Special Projects Section of the Research and Development Division.

HERBERT MARSHALL,  
*Dominion Statistician.*

Ottawa, July, 1956.





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**Symbols and Abbreviations**

The interpretation of the symbols or abbreviations used in the tables in this publication is as follows:

- This symbol is used to indicate that the entry in a cell of a table is defined to be zero by the conceptual framework.
- This symbol is used where the entry in a cell is estimated to be zero or where the amount is too small to be shown in the units of a table. In most tables this refers to an amount of less than \$50 thousand.
- ... Figures not applicable.
- c.i.f. Cost, insurance, and freight.
- f.o.b. Free on board.
- n.e.s. Not elsewhere specified (or included).



# THE INTER-INDUSTRY FLOW OF GOODS AND SERVICES, CANADA

1949

## Introduction

The *National Accounts, Income and Expenditure* represented an important advance in Canadian economic statistics by presenting the measurement of the nation's output during a period of time in the form of a set of balancing accounts. This procedure, which is analogous to the practice of businessmen in setting up their statements in the form of balancing accounts, was extended to include separate revenue and expenditure accounts for broad sectors of the economy: persons, governments, and business. This study of the **inter-industry flow of goods and services (input-output table)** is an application of the same technique to the study of the disposition of output of industries and of the origin of the materials and services used in producing that output. The main emphasis of the table is on transactions between industries; it will be shown, however, that the table may also be considered as an extension of the National Accounts<sup>1</sup>. The table may be used to assist in studying the effect of changes in various components of gross national expenditure upon industrial output and upon the industrial distribution of national income or the effect of changes in prices and other variables affecting industrial output.

Although this way of portraying the industrial production of an economy was first devised by Francois Quesnay, who published a "Tableau Economique" in 1758<sup>2</sup>, and although the structural interdependence of the various parts of the economy had been stressed by many nineteenth century economists, particularly Léon Walras in 1874<sup>3</sup>, it was not until Wassily Leontief, of Harvard University, applied the idea to the United States economy in a number of studies (the first of which was published in 1936<sup>4</sup>), that inter-industry tables were adopted as a method of analyzing the productive activity of an economy. Inter-industry studies have now

been completed by the United States, the United Kingdom, Italy, the Netherlands, Norway, Denmark, and Japan, and beginnings have been made by Australia and several other countries. The Harvard Economic Research Project, directed by Professor Leontief, is an important centre of theoretical research on input-output analysis.

## 1. The Conceptual Framework of the Table

### (a) The basic transacting unit—the industry

Since the table is primarily concerned with analyzing the output of and the input into industry, it is appropriate to begin with a discussion of what is meant by an industry. The term "industry" is used in this study to include all productive activity carried on in the economy except for non-commercial work done in a household. This definition of industry is the same as is used in the Dominion Bureau of Statistics, *Standard Industrial Classification Manual* (Ottawa, 1948) and includes government service as an industry as well as persons or associations of individuals who hire employees or otherwise engage in industrial transactions.

In the case of a firm or enterprise which carries on a variety of activities, a problem of dividing the firm into a number of homogeneous units suitable for input-output studies arises. To attempt to define each separate production process or activity as the basic unit means, in most cases, adopting a unit of the firm which is smaller than the unit used for accounting purposes. Most firms do not keep separate statistics for each production process on shipments, inventories, employment and payrolls, and materials, fuel, and electricity used. In most cases, however, such statistics are available for each establishment (factory, plant, farm, mine, store, and so forth). **The basic unit classified by an industrial classification is, therefore, the establishment—the smallest unit within the firm for which the various industry statistics are available separately**<sup>5</sup>

An industry is a group of establishments which have sufficient common characteristics that they may be grouped together for analytical purposes<sup>6</sup>. They may, for example, manufacture similar end products (the furniture industry) or they may all

1. For an explanation of National Income concepts see Dominion Bureau of Statistics, *National Accounts, Income and Expenditure, 1926-1950* (Ottawa, 1952), 83-7; United Nations, *A System of National Accounts and Supporting Tables*, Studies in Method, Series F, no. 2 (New York, 1953); and S.A. Goldberg, "The National Accounts-Concepts and Applications," *Canadian Journal of Agricultural Economics*, II, spring, 1954, 1-14.

2. This Tableau is reprinted in the introduction to the Modern Library edition of Adam Smith, *The Wealth of Nations* (New York, 1937). An exposition of the Tableau as an input-output table is contained in Almarin Phillips, "The Tableau Economique as a Simple Leontief Model," *Quarterly Journal of Economics*, LXIX (Feb., 1955), 137-144.

3. Léon Walras, *Éléments d'économie politique pure*, (Lausanne, 1874).

4. Wassily Leontief, "Quantitative Input and Output Relations in the Economic System of the U.S.," *Review of Economics and Statistics*, XVIII (Aug., 1936), 105-125.

5. See United Nations, *International Standards in Basic Industrial Statistics*, Statistical Papers, Series M. no. 17, 1953, 10; W.R. Simmons, "The Elements of an Industrial Classification Policy," *Journal of the American Statistical Association*, XLVIII (Sept., 1953), 435-6; and D.B.S., *Standard Industrial Classification Manual*, 2

6. See E.A.G. Robinson, *The Structure of Competitive Industry* (revised ed., Cambridge, 1935), 6-13; Joan Robinson, "Imperfect Competition Revisited," *Economic Journal*, LXIII, (Sept., 1953), 579-81; and D.B.S. *Standard Industrial Classification Manual*, 1-5.



use the same principal component material (the iron and steel industry). Sometimes it is the technological process that is similar (rolling mills). It has been said, therefore, that "Industries as such have no identity. They are simply a classification... (of establishments) which may for the moment be convenient. A change of technique and of organization may require a new classification and a new industry"<sup>7</sup>. Generally, however, such changes occur slowly so that revisions to an industrial classification do not occur so frequently as to make the classification unsuitable for the analysis of industrial change.

If an establishment produces two products, for example; coke and chemicals, its classification depends on which of these two products constitutes the greater proportion of its gross value of production. If this were chemicals, all the output of the establishment would be classified to the chemical products industry. If coke came to constitute the larger proportion of the gross value of output, the establishment would be reclassified to the products of coal industry.

The table divides the economy into forty-two industries, which are a grouping of industries listed in the Bureau's Standard Industrial Classification (see Table 7, page 28). Because of data problems, however, certain deviations from the principle of making the establishment the basic unit of the table have been necessary. Some of these deviations may possibly be justified on the grounds that they improve the analytical usefulness of the table to an extent that more than compensates for the departure from the uniform use of the establishment concept. They are explained in detail in section A of the Appendix.

The D.B.S. Census of Manufacturing Industries, for example, is a census of manufacturing activity rather than a census of all activities carried on in manufacturing establishments. The only activities included in manufacturing are the manufacture or repair of products and some distribution activity associated with the shipment of these goods. Examples of activities carried on in manufacturing establishments upon which complete data were not collected in 1949 were the purchase and sale of goods without further processing, the operation of trucking fleets, operation of cafeterias, and the performance of construction with an establishment's own labour force. Within these limits, however, manufacturing in the inter-industry table is defined on an establishment basis.

The difference between classifying on an activity basis and an establishment basis can be illustrated by trucking. Assume that a manufacturing plant has its own trucking fleet which is used to distribute its products. Under an establishment classification the gasoline, oil, depreciation, and other expenses would be shown as inputs into the

manufacturing industry. Under an activity classification this transportation activity would be transferred to the transportation sector and these items would be shown as inputs into the transportation sector and the manufacturing sector would be shown as consuming an input from the transportation sector equal to the cost of operating its own trucks during the year. In the 1949 table, transportation is on an establishment basis as far as the available data permit.

All construction activity, on the other hand, whether new or repair, or whether put in place by contractors or by the labour force of establishments whose principal activity classifies them to other industries, has been included in the construction sector<sup>8</sup>. The main reason for this was that the allocation to the industry of origin of the materials used in construction activity was made by making estimates of the disappearance of construction materials. No data were available on an establishment basis for the use of construction materials for construction work done on "own account" by manufacturing industries and many service industries; neither was it possible to separate materials used for new construction from materials used for repair. Since all construction activity (including repair) is included in the construction sector, all other industries have been defined to exclude construction activity carried on by their own labour forces. This required that adjustments be made to wages and salaries in each industry to exclude the wages paid to its own labour force for repair or new construction.

#### (b) The transactions - input and output

Three basic types of transactions are depicted in the inter-industry flow table. A schematic arrangement of these transactions is shown in the diagram on page 11 which sub-divides the table into three main quadrangles - quadrangle IV, as is explained below, contains only a entry for indirect taxes. These quadrangles will be explained in terms of the classification of the output of and the input into the various industries<sup>9</sup>.

##### (1) Definition of output

As has been mentioned above, the table is primarily concerned with analyzing the components of forty-three figures - the total output of the forty-two domestic industries and the total imports of goods and services. (These figures are shown in the right-hand column of the table.) The output of these industries consists of new goods and services brought into existence through the transformation of materials, labour, capital, and other inputs. Output

8. In the National Accounts construction is classified on an establishment basis.

9. For a general discussion in terms of quadrangles of some of the properties of social accounting tables, see E. Fuerst, "The Matrix as a Tool in Macro-Accounting," *Review of Economics and Statistics*, XXXVII (Feb., 1955), 35-47.



which is used by the establishment producing it is excluded, however, from the total output figures. For example, if within the same establishment cotton thread was manufactured and then used to weave fabrics, only the fabrics would be counted as output—the thread would be an intermediate product of the establishment which would not be counted. The output of an establishment during a period of time can be measured by its shipments (sales plus transfers between plants within the same company), plus the increase (or minus the decrease) in its inventory of finished products of own manufacture, plus the increase (or minus the decrease) in goods in process during the period. (Since the table balances input against output, it is necessary to take the change in goods in process during the period into account.)

In addition to the qualifications to the definition of industry output introduced by the partial modification of the establishment basis to an activity definition, the receipt of investment income by establishments required special treatment. The output of an industry is measured by the total revenue received from its operating activities (the production of goods and services); non-operating revenue such as capital gains and losses and the receipt of interest and dividends are excluded from the measure of output<sup>10</sup>. The table therefore shows all interest and dividends paid as if they were paid directly to persons, governments, or non-residents; that is, as primary inputs into the industry paying them. Thus, this return to capital is shown in the industry where the capital is used, not where it is owned. This treatment of investment income is identical with that followed in the National Accounts.

This decision not to show industries as receiving interest meant that the measure of output of financial institutions excludes the receipt of interest. The output of banks and other financial institutions is measured by their income, other than interest, from the services they provide. Part of this service is measured by the charges made for bank services (cashing cheques, issuing money orders, buying and selling foreign exchange, and so forth). Part of the services to depositors, however, are paid for by the depositor allowing the use of capital without interest or at a lower rate of interest. Accordingly, imputations are made in the National Accounts to account for the value of these services provided to persons and to governments<sup>11</sup>. Since no imputation is made for services

provided to other industries, profits of other industries are overstated and banking output is understated. At present, no imputation is made for services provided by the Bank of Canada.

The "transfer" portion of interest on consumer debt is omitted from both personal expenditure and investment income, since this is treated as a transfer payment rather than a payment for a service. A consumer loan does not yield an income similar to that yielded by a loan to industry which is used to produce a stream of goods and services out of which the interest is paid. The interest on a loan which is used to finance consumer goods can only be paid from accumulated assets or from production elsewhere in the economy. In either case this type of interest is treated as a transfer payment and not a payment for a productive service.

Unlike most manufacturing and service establishments, the receipts and payments of life insurance companies are not identified with output and input, respectively. Their services are rendered largely to persons and are not usually exchanged for a specific and identifiable fee. The value of these services must, in consequence, be made the subject of special procedures. Life insurance companies are therefore treated as if they were associations of individual policy-holders employing a staff to manage the affairs of the business on their behalf. Interest and other investment income accruing on behalf of policy-holders are shown as if they were paid directly to persons, i.e. as primary input originating in the industry. The total administrative expenses are included as an element of personal expenditure on consumer goods and services (as a measure of the life insurance service to individuals), i.e. as if persons purchase the entire output of the industry which is defined to equal the total administrative expenses. Premiums and claims are disregarded.

Another item of investment income which was treated specially was gross rents paid on non-residential buildings<sup>12</sup>. Three possible ways of treating payment of rent in the inter-industry flow table were considered: (1) The first possibility is to consider gross rent as an intermediate input into an industry which is paid to the industry which actually owns the building or equipment. The net rent (gross rent less expenses) would then be shown as originating in the industry which owned the property. For example if a retail trade establishment is renting a store which is owned by an establishment classified in the chemical products industry, the gross rent is shown as a payment by retail trade to the chemical industry. This alternative reflects as closely as possible the actual institu-

10. The profits figures shown in row 47 of the table are obtained from Department of National Revenue, *Taxation Statistics*. Dividends from Canadian corporations are already excluded from these profit figures. Arithmetically, the exclusion of other dividends and interest from revenue was accomplished by subtracting interest and dividends received from interest paid. (This net figure is the "other income" (row 48) of the table).

11. If this imputation were not made, the fact that investment income originating in an industry is shown on a "net" basis (paid less received) would have resulted in a negative income originating in the industry.

12. All rents, paid and imputed, on residential dwellings are shown as if they were paid to a "dummy" industry within the real estate group. No imputations are made in the National Accounts for rent on owner-occupied non-residential buildings.



tional arrangements in the economy and is the method followed in the industrial distribution of national income in the National Accounts. (ii) It can be argued that renting is an alternative way of obtaining control of capital equipment. A firm might have borrowed money and purchased the land or building outright instead of renting. According to this argument the net rent would be shown as income originating in the industry where the capital equipment was used and the expenses shown as input into that industry. The total income originating in the industry would then represent the return to the factors of production actually used in producing the goods and services produced in an industry. In the above example, the net rent would be shown as originating in retail trade; the chemical industry would not appear in the transaction. (iii) The third method, and the one actually used for the inter-industry flow table, is to set up a "dummy" industry within the real estate group which would receive all rents and purchase all inputs associated with the rental of buildings. In the above example, the retail trade store would be shown as paying rent, not to the chemical industry, but to the real estate industry. It was agreed that the table should follow the National Accounts as much as possible in reflecting the institutional arrangements but it was also agreed that it was desirable to keep as closely as possible to a definition of industry output which excludes all investment income. The device of showing all rents as being paid to the real estate industry was therefore adopted.

#### (ii) Channels of distribution and valuation of output

The method used to show the distribution channels through which the goods and services flow from the producer to the user requires explanation. It was decided to show a direct link between producer and user rather than to complicate the tracing of goods through the table by showing the various distribution channels through which they flow. (As will be seen later, this has considerable advantage for some potential uses to which the table may be put.) Two methods of short-circuiting the flow through transportation, wholesale, and retail trade channels were possible. The method adopted was to show, for example, a consumer who purchases soap as if he purchased directly from the chemical products industry a bundle of goods and services which include the value of the soap f.o.b. factory, plus wholesale and retail trade margins, plus transportation and any other distribution costs, plus indirect taxes less subsidies, if any. Under this method, the output of the chemicals products industry was defined to include, not only the cost of manufacturing the soap, but all costs involved in moving the soap from the factory to the ultimate user. This method of valuing the output of industry is known as the "purchasers' price" method.

The output of the trade industries is defined under this method as their gross profit margin, rather than their total sales. In the above example, in order to make the total input for the chemical

products industry equal to the value of its output, the transportation costs, trade margins and indirect taxes less subsidies, are shown as inputs into the chemical industry. For example, if the cost of the bar of soap purchased by a person in a retail store was ten cents, the output of the chemical products industry would be measured by this value (the purchasers' price). The inputs into the industry would be the various inputs required to make up the delivered cost of the soap. If the cost of production of the soap was seven cents, transportation costs were one cent and wholesale and retail gross profit margins were two cents, these should all be shown as inputs into the chemical products industry so that the value of total input into the industry would add up to the total value of output.

An advantage of using the purchasers' price method is that the value of final output is measured in the same prices as the values of the various components of gross national expenditure. A disadvantage, however, is that the output totals for each industry contain an estimate of distribution costs which may be subject to a large margin of error.

An alternative method—the method of "producers' prices"—is to show the transaction as if the consumer paid the producer the factory value of the soap, and then paid separately to each of the distributing agencies the amount that they charged for their services. In the above example, under this method, the value of output of the chemical industry would only be seven cents (the cost of production, f.o.b. plant) and the consumer would be shown as paying one cent to the transportation industry and two cents to wholesalers and retailers. That is, the distribution costs are shown in the column for the producer when purchasers' prices are followed; in the column for the purchaser, when producers' prices are used.

The decision to short-circuit the flow through trade establishments was coupled with a decision to treat packaging and other similar preparation of commodities by trade establishments as part of the distribution process. The cost of containers used are shown as inputs into the trade industries but are not related to the commodities packaged by trade establishments. For example, plants which pasteurize and bottle milk but do not manufacture other dairy products are classified by the Bureau's Standard Industrial Classification as retail trade establishments. Thus, the purchase of milk pasteurized in a bottling plant is shown in the table as if it were purchased directly from agriculture. The input from trade into agriculture includes the gross profit margin (including the cost of containers used) of the bottling plant and the cost of bottles used appear as an input into the trade industries.

Since the definition and coverage of manufacturing used in the input-output table follows that used by the Census of Industry, other such packaging or manufacturing activities carried on by estab-



lishments not covered by the Census of Industry are treated in a similar manner—for example, slaughtering or meat packing on the farm or by small butcher shops.

### (iii) Disposition of output

The table has one row and one column for each industry. Any one row shows the disposition of the output of a particular industry. Output has been divided into two parts: intermediate output and final output. **Intermediate output**, which is shown in quadrangle I of the table, represents the materials and services used by other establishments during the period in producing their output. If the industry which used these materials as an input purchased one hundred units during the year, but used only ninety units, the remaining ten units representing an increase in raw material inventories, then the figure which will be entered in the appropriate cell of quadrangle I of the table will be the ninety units used, not the one hundred units purchased. In the event that the using industry reduced its raw materials inventories during the year, input would exceed purchases. It will be noticed that the intermediate output of one industry is the intermediate input into another industry. Thus each cell of quadrangle I represents two ways of looking at the same transaction. A great advantage of this type of tabular (matrix) presentation is that a single entry can be used to show both sides of a single transaction. Another feature of the table is that intermediate input and output have been classified in

the same way—the same forty-two industry classification—so that the transactions are shown on a “from-whom-to-whom” basis. Since the main contribution of the Table is quadrangle I, this quadrangle has given the table its name—the inter-industry flow of goods and services (or inter-industry input-output relationship)<sup>13</sup>.

**Final output** is shown in quadrangle II and is defined to include all gross national expenditure categories, except for imports which are treated as an input. The final output categories are expenditure by persons on consumer goods and services, expenditure by governments on goods and services<sup>14</sup>, gross domestic investment in durable physical assets, the net change in inventories of the products of an industry (regardless of where they are held or by whom they are owned), and the export of goods and services. Since intermediate output includes only the materials and services used up during the accounting period, the table does not show which industries are accumulating inventories

13. Input-output is a general terms for this type of table. Since this particular table is concerned only with industry flows, it is more accurately described as the inter-industry flow of goods and services or inter-industry input-output.

14. Government appears in the inter-industry flow system both as a producer of “government service” (which might be called “public administration and defence”), included in the service industry group, and as a final user, “government expenditure on goods and services.” This final output sector by definition consumes all the output of the government service industry.

Scheme of the Table of the Inter-Industry Flow of Goods and Services

For the disposition of output of an industry, read the row for that industry.  For the origin of input into an industry, read the column for that industry.	Industry 1 ..... Industry 42	Gross National Expenditure Categories <sup>1</sup>  (columns 45 to 49)	Total Output (row totals)
	Industry 1 ..... Industry 42		
Industry 1 Industry 2 . . . . . . . Industry 42 Imports of Goods and Services	QUADRANGLE I:  Intermediate Output and Intermediate Input (Inter-Industry Transactions)	QUADRANGLE II:  Final Output	
Gross National Product Categories (rows 46 to 51)	QUADRANGLE III:  Primary Input	QUADRANGLE IV:  Indirect Taxes on goods imported for final output categories which did not require further processing or assembly	
Total Input (column totals)			

1. Imports of goods and services are shown as an input instead of a deduction from exports of goods and services.

or which industries are purchasing machinery and equipment. These items have been defined as final output.

#### (iv) Origin of input

Each column of the table shows the origin of input into an industry. The value of total input is defined to be identical to that of total output of the industry; thus all components of the purchasers' price of output are accounted for as an input into the industry. (The total input figures in the bottom row of the tables are identical with the industry output figures in the right-hand column). Input has also been divided into two parts: intermediate input and primary input. **Intermediate input**, which is also the intermediate output of other industries, was explained above and includes the materials and services produced in this and other domestic industries or imported for use in further processing.

**Primary input**, which is shown in quadrangle III of the table, includes the payments for the services of the factors of production—wages and salaries; corporation profits (dividends paid plus retained earnings before taxes); net income of unincorporated business; bond, mortgage, and other interest<sup>15</sup>; net rents received in the real estate industry<sup>16</sup>; profits of government business enterprises; and other miscellaneous investment income. In addition, primary input also includes depreciation allowances and similar business costs (such as bad debt allowances and the claim portion of insurance against fire loss)<sup>17</sup> and indirect taxes less subsidies. In other words, the components of primary input are the gross national product categories<sup>18</sup>. The inclusion of items such as profits and indirect taxes which are not normally thought of as physical inputs also ensures that the value of total input is identical with the market value of total output.

The entries on the principal diagonal of quadrangle I of the table may require further explanation. Output has been defined to include products used by other establishments within the same industry<sup>19</sup>. These appear in the table both as an output and as an input of the same industry. An advantage of this procedure is that the output figures do not change in total if the classification system is changed (for example, if two industries are combined into one).

15. The reader will recall that the exclusion of interest received from the measure of output means that interest paid is shown on a net (paid less received) basis.

16. It was explained above that all gross rents are shown as if they were paid to the real estate industry.

17. See page 50 for a fuller discussion of these "similar business costs".

18. The industrial distribution of national income which can be derived from the inter-industry flow table differs from Table 20 of the *National Accounts, Income and Expenditure, 1926-1950* in the following respects: (i) the classification of net rents, (ii) the classification of construction, (iii) the classification of corporation profits which are on an establishment basis in the inter-industry study but on an enterprise basis in the *National Accounts*.

19. The agriculture, metal mining and non-ferrous smelting and refining, and primary iron and steel industries are exceptions. See the definition of output for these industries in Section A of the Appendix.

#### (v) Imports

Imports are shown as inputs entering the economy into the industry in which they are first used. Thus, the table distinguishes the extent to which materials or services used are obtained from domestic sources or from foreign sources<sup>20</sup>. This is consistent with the decision to show in the table the origin of the actual mixture of inputs into an industry. An alternative would have been to show imports as an input into the domestic industry producing similar products and to show the distribution of imports to using industries as if they were produced by the domestic industry. If the output of industries were adjusted to include only principal products, the table would then become an approximation to a commodity flow table. It was decided, however, to have the present table reflect the actual mixture of products produced by industry.

Imports were treated in the inter-industry study as if they were a producing industry. Thus the row for imports in the table is included in intermediate input rather than primary input. This procedure was adopted so that primary input categories would be identical with the gross national product categories. There is no column for imports in the table. It would have been possible, however, to have a column for imports and show all imports entering the economy into this column. The total delivered value of the imports comprises four items: (i) the total value of imports f.o.b. point of shipment plus transportation and insurance costs to the Canadian border (row 43), (ii) customs import duties (row 49), (iii) federal excise and provincial and municipal sales taxes (row 50), and (iv) the distribution and installation costs from the border to the site of the user (mostly in row 38). This importing sector could then have been shown as distributing imports to the using industries at purchasers' prices. If this treatment had been adopted, quadrangle IV of the table would have been empty. Since this method would not have shown in the table the distribution of customs duties according to the industries or sectors in which the dutiable goods were used, it was rejected in favour of method which dispensed with a column for imports.

The method chosen was to show the input of imports into an industry or sector valued c.i.f. the Canadian border; customs import duties and other indirect taxes are shown as primary inputs into the industry or sector using them; and the transportation costs, trade margins, and other costs involved in moving imported goods from the border to the user are shown as intermediate input into the using industry. The federal excise taxes and provincial and municipal taxes are therefore added to the taxes on the products produced by an industry and the domestic distribution costs on imports are added to the costs of distributing the output of the industry. Under this method, quadrangle IV of the table contains indirect taxes on goods imported for final output categories which did not undergo further processing or assembly in Canada.

20. For this study Newfoundland was treated as if it were part of Canada for the whole of 1949. This required certain adjustments to exports and imports which are explained in the Appendix.



### (c) Summary

The principal contribution of the inter-industry flow table is that it shows the industry of origin of the materials and services which were used in 1949 by the various industries to produce the nation's output. It does not, however, show the type or quantity of capital equipment used in each industry. Conceptually the table could be set up in terms of physical units of commodities and services; however, because of the complexities involved and the desirability of making total input and output for an industry add to the same total, the flows are expressed in terms of the average prices prevailing in 1949<sup>21</sup>. It must be remembered that a large num-

21. Within 1949 prices were relatively stable. The value of gross national product at market prices increased by 5% during the year; 3% of this increase was attributable, however, to an increase in the physical volume of output (partially a result of Newfoundland's entry into Confederation). The general wholesale price index declined gradually by approximately 2.5% during the first three quarters of the year and then rose by 1% during the last quarter. Most of the movement was in the farm products, raw materials, and food components; the manufactures group being more stable. The cost-of-living index rose by 1.6% during the first three-quarters and declined by almost 0.5% during the last quarter. Most of the movement was in the food, fuel and lighting components, while rent rose steadily during the year. The inter-industry flows were therefore not influenced by substantial prices changes during the year.

ber of possible productive techniques existed and the table shows only the set of techniques which were actually used in 1949. For example, the relative price structure plays an important role in determining the productive techniques which are actually selected from the possible alternatives which exist in a particular year. If a different set of relative prices had existed in 1949, a different combination of materials and services might have been chosen to produce the nation's output.

### 2. An Illustration of the Inter-Industry Flow of Goods and Services

A simple example will serve to illustrate the flow of industry output through the table. Wheat is produced by agriculture, used by the flour milling industry to make flour, the flour is used by the baker to make cakes, and finally, the cake is sold to a housewife. These transactions would appear in an inter-industry flow table as follows:

The entry of the figure 10 in the row for agriculture and the column for the grain mill products industry represents, in this example, the use of 10¢ worth of wheat obtained from the domestic agriculture industry by the grain mill products industry. The 15 represents the use of 15¢ worth of flour (produced from the 10¢ worth of wheat by the grain mill products industry) by the bakery products industry. The 25 represents the sale of a cake made by the bakery products industry to a person.

	1	2	3	4
For the disposition of output of an industry, read the row for that industry.				
For the origin of input into an industry, read the column for that industry.				
(Purchasers' prices in cents)				
	Agriculture	Grain mill products	Bakery products	Personal expenditure on consumer goods
1. Agriculture .....		10		
2. Grain mill products .....			15	
3. Bakery products .....				25

If we turn to the 1949 table of the inter-industry flow of goods and services (Table 1), the corresponding figures represent a more heterogeneous group of commodities. Since the grain mill products industry group includes feed mills as well as flour mills, grain for feeds as well as grain for flour is included in the \$269.5 million of the output of agriculture used by the grain mill products industry (see column 11, row 1 of Table 1). About 74% of this amount represents wheat, 10% barley, 12% oats, and various other grains and grasses make up the remainder. Moreover, this does not represent the total amount of grains and grasses used by the in-

dustry. About half of the \$14.5 million of imported materials and services used in the grain mill products industry (column 11, row 43) consisted of grains (mainly corn). The \$53.1 million input from the grain mill products industry into the bakery products industry (column 12, row 11) consists of flour used for baking bread, cakes, and other bakery products.

Personal expenditure on the output of the bakery products industry in 1949 amounted to \$254.2 million (column 45, row 12). This figure represents the price paid by the consumer for bread, cakes, bis-

cuits, and other products produced by the bakery products industry. This price includes the cost of production, transportation costs, wholesale and retail trade margins, and sales taxes (if any). The figures in the table represent in most cases, therefore, an aggregation of commodity and service flows into industry-of-origin totals. Wheat, as a commodity, cannot be traced through the table.

Thus far we have illustrated the flow of products through the economy; the example can be extended to include a simplified set of transactions which might be involved in producing these goods.

Two industry groups—confectionery and sugar refining, and transportation, storage, and trade—and primary input categories have been added to the

	1	2	3	4	5	6	7	8	9
For the disposition of output of an industry, read the row for that industry.									
For the origin of input into an industry, read the column for that industry.									
(Purchasers' prices in cents)									
	Agriculture	Grain mill products	Bakery products	Confectionery and sugar refining	Transportation, storage, and trade	Total intermediate input (Columns 1+...+5)	Personal expenditure on consumer goods and services	Total final output (Column 7)	Total output (Columns 1+...+5+8)
1. Agriculture .....		10		1		11			11
2. Grain mill products .....			15			15			15
3. Bakery products .....							25	25	25
4. Confectionery and sugar refining .....			3			3			3
5. Transportation, storage, and trade .....	2	1	2	--		5			5
6. Total intermediate input (Rows 1+...+5) .....	2	11	20	1					
7. Wages, salaries and supplementary labour income .....	6	1	3	1	2				13
8. Corporation profits before taxes .....		1	1	1	1				4
9. Other income .....	1				1				2
10. Depreciation allowances and similar business costs .....	2	2	1		1				6
11. Total primary input (Rows 7+...+10) = gross domestic product at market prices .....	9	4	5	2	5				25
12. Total input (Rows 1+...+5+11) .....	11	15	25	3	5		25	25	84

example. To simplify the example, however, international trade and indirect taxes have both been excluded.

The output of agriculture now includes 1¢ worth of sugar beets which were used by the confectionery and sugar refining industry in producing sugar. The total output of agriculture is now the sum of the value of the wheat and the sugar beets produced. On the input side, the value of this 11¢ worth of output of agriculture must be accounted for at its delivered value to the users—the grain mill products and confectionery and sugar refining industries—by entering in column 1 the various inputs. Distribution costs involved in moving the wheat and sugar beets from the farm to the using industries amounting to 2¢ are entered in column 1 in the transportation, storage, and trade row. It is assumed in this example that no materials were used to produce this output but that the amount of capital

equipment (tractors and so forth) used up was worth 2¢ and so an entry is made for depreciation allowances of this amount. Labourers received 6¢ and the remaining 1¢ accrued to unincorporated farm operators as net income. The inputs into the grain mill products industry were assumed to have a similar pattern except that wheat produced by agriculture constitutes the principal input and the mill was assumed to be owned by an incorporated company so that the net income appears as corporation profits.

The bakery products industry has two commodity inputs in this example: flour from the grain mill products industry and sugar from the confectionery and sugar refining industry. The input of 2¢ from the transportation, storage, and trade industry group represents the transportation costs and the wholesale and retail trade margins added to the factory price of the cake to bring it to the delivered price



paid by the consumer. The entry is made in this manner because of the measurement of output at purchasers' prices. The table does not indicate who paid the distribution costs or indirect taxes.

It was assumed that the difference between the producers' price for sugar and the purchasers' price was less than  $\frac{1}{2}\%$  and this amount is represented in the table by the symbol (--). This simplified model shows only primary inputs as comprising the total value of input into the transportation, storage, and trade group. Again to simplify the example such intermediate inputs as gasoline, replacement parts, and so forth were ignored.

### 3. Gross Domestic Product and Expenditure

The total primary input into each industry measures the costs arising from the use of capital and labour in the industry together with "pure" profit (if any). That this provides an unduplicated measure of the total output of the economy during the period can be seen by noting that the total primary input into an industry is equal to the total output of the industry minus the total intermediate input (goods and services produced by other domestic industries) into the industry. Thus, primary input is equal to the "value added" by the industry<sup>22</sup>. The sum of the values added (primary input) is therefore also equal to the value of final output—the cake—and is an alternative way of measuring the market value of the nation's output during the period. Arithmetically, this must be so because total final output is equal to total output less total intermediate output (total intermediate output is identical with total intermediate input).

In an open economy this identity between final output and primary input does not hold since the payment for imports represents an expenditure on the output of other countries. To preserve the identity, therefore, imports of goods and services must be subtracted from total final output; that is, total final output less imports is equal to total primary input.

Total final output less imports of goods and services measures therefore the total output at market prices of the domestic factors of production (factors located in Canada). These factors may be owned either by Canadians or foreigners. Total final output includes the replacement of capital equipment used up in producing these goods and services and includes therefore a "gross" measure of investment expenditure rather than a "net" measure. The name given to this measure of output is the "gross domestic product (or expenditure) at market prices".

22. This is a more refined concept of value added than that used by the Census of Industry to obtain "net value of production" or "value added by manufacture". The Census concept is obtained by subtracting only the cost of materials, fuel, and electricity used from the gross value of products. Primary input is equal to the gross value of production less the cost of materials, fuel, and electricity used and less the cost of such operating expenses as office supplies, repair and maintenance, purchased transportation services, advertising, communication, insurance, rent, professional and other services. Primary input is therefore an unduplicated measure of value added for the whole economy.

Turning to the inter-industry flow table, it can be seen that in 1949 total final output was \$20,058 million (column 50, row 53) and is the sum of the following components:

Personal expenditure on consumer goods and services .....	\$10,963 million
Government expenditure on goods and services .....	\$ 2,128
Gross domestic investment (ex inventories) .....	2,968
Change in inventories .....	73
Exports of goods and services .....	3,928
Residual error of estimate.....	- 2
	<hr/>
	\$20,058 million
If the total imports of goods and services (column 43, row 51) is subtracted .....	- 3,447 million
The total is gross domestic expenditure at market prices .....	<hr/>
	\$16,611 million

Gross domestic product at market prices (total primary input) is shown in the table as \$16,611 million (row 52, column 51). It is the sum of the following components:

Wages, salaries and supplementary labour income .....	\$ 7,876 million
Corporation profits before taxes.....	1,906
Other income <sup>23</sup> .....	3,561
Customs import duties .....	230
Other indirect taxes less subsidies.....	1,600
Depreciation allowances and similar business costs .....	1,437
Residual error of estimate.....	1
	<hr/>
	\$16,611 million

This concept of domestic product differs from the Bureau's definition of the more familiar concept of gross national product at market prices in two respects. (i) The domestic product refers to production of goods and services within the geographic boundaries of Canada (and has sometimes been called the geographic product), whereas the national product refers to production by Canadian residents. Gross domestic product equals gross national product minus factor shares (chiefly interest and dividends) received by Canadian residents from foreign countries plus factor shares (again, chiefly interest and dividends) paid by Canadians to residents of foreign countries. (ii) To be consistent with the valuation of production, inventories should be valued by multiplying the physical change by weighted average prices during the year rather than at book value. Since inventories often contain goods produced in previous years, an adjustment to current year values is necessary to allow for the carry-over portion. To make this inventory valuation adjustment it is necessary to make assumptions about the commodity content of inventory holdings, the normal turnover period for the industry, and the accounting methods used by the firms in arriving at book values. This adjustment removes from profits un-

23. This item consists of:	
Investment income (exc. corporation profits).....	\$ 846 million
Net income of unincorporated business....	2,873 million
Inventory valuation adjustment.....	- 158
	<hr/>
	\$ 3,561 million

realized gains or losses arising from the holding of inventories. The reconciliation between gross national product and gross domestic product for 1949 is as follows:

Gross national product at market prices in 1949 .....	\$16,462 million
Less: interest and dividends received from abroad .....	- 83
Plus: interest and dividends paid abroad .....	390
Inventory valuation adjustment .....	- 158
Gross domestic product at market prices <sup>24</sup> .....	\$16,611 million

#### 4. The Inter-Industry Flow of Goods and Services by Broad Divisions of Industry

Table 4 shows an aggregation of the forty-two industries in Table 1 into eight industry groups. This table shows in a summary fashion the inter-relationships between manufacturing and agriculture and the extractive industries on the one hand and construction and other service industries on the

24. In addition to the adjustment for interest and dividends, adjustment should be made for wages and other factor shares but these are small in magnitude and tend to cancel out. Sources: D.B.S., *National Accounts, 1926-1950*, pp. 26-29, and D.B.S., *Canadian Balance of International Payments during the Post-War Years, 1946-1952* (Ottawa, 1953), p. 90.

other. Intermediate output comprised 44% of total manufacturing output and final output was 56%. The intermediate output of manufacturing was used by the following industrial groups: 10% by agriculture and the extractive industries; 43% by other manufacturing establishments; 20% in construction; 21% by public utility, trade, and various service industries; 7% remaining unallocated. On the input side, 67% was intermediate input and 33% was primary input. The intermediate input came from the following sources: 20% from domestic agriculture and extractive industries; 28% from other manufacturing establishments; 30% from construction, trade, public utilities, and various service industries (including distribution costs paid to other industries); 15% for imported goods and services; 7% remaining unallocated.

The table may also be used to demonstrate a third method of measuring the gross domestic product at market prices. As was pointed out in section 3, the value added in each industry (the gross domestic product at market prices originating in the industry) is equal to the difference between total output at purchasers' prices and total intermediate input. This can be seen from the following figures taken from Table 4:

	Total output at purchasers' prices (Column 17 of Table 4)	Total intermediate input (Row 11 of Table 4)	Value added at market prices
	\$ million	\$ million	\$ million
Agriculture .....	3,103.0	1,254.2	1,848.8
Forestry, fishing, hunting and trapping .....	581.7	188.0	393.7
Mining, quarrying, and oil wells .....	1,180.6	527.9	652.7
Manufacturing .....	15,288.8	10,245.9	5,042.9
Construction .....	2,844.7	1,743.2	1,101.5
Transportation, storage, and trade .....	4,492.4	1,360.5	3,131.9
Electricity, water, and gas utilities .....	479.2	189.8	289.4
Communication, finance, insurance, real estate, and service industries .....	6,058.5	2,216.5	3,842.0
Indirect taxes less subsidies on goods imported for final output categories which did not require further processing or assembly .....			173.3
Unallocated indirect taxes less unallocated subsidies .....			133.7
Residual error of estimate .....			+ 1.0
Gross domestic product at market prices .....			16,611.0

Indirect taxes and subsidies create a difficulty for this value added method since it is necessary to estimate any indirect taxes and subsidies which have not been included in the estimates of industry output at purchasers' prices. These comprise indirect taxes or subsidies on goods imported for final output categories which did not require further processing or assembly in Canada and unallocated indirect taxes and subsidies. The method is better suited, therefore, for a measure of output which excludes indirect taxes. If industry output figures at producers' prices are used and the total of intermediate input as defined for a producers'

price table plus customs import duties and taxes on imports used in the industry are subtracted, a measure of value added, known as the gross domestic product at factor cost, is obtained. To this could be added the total estimate of indirect taxes less subsidies to arrive at the market price concept.

The value added figures at market prices by industry are, of course, identical with those for primary input shown in row 17 of Table 4. The gross domestic product at market prices can be estimated either by estimating value added from total output and total intermediate input data or by summing the



various primary inputs. A third method of estimation can be made, as was explained earlier, by summing the components of final output and deducting total imports of goods and services. In practice the value added method of estimating gross domestic product is not used in Canada because of statistical gaps which make it impossible at the present time to estimate total intermediate input for many industries independently of the measure of total output.

### 5. Some Potential Uses of the Table

One example of the way in which the *National Accounts, Income and Expenditure* are extended by the inter-industry flow table, is as a method of analyzing the effect of gross domestic investment expenditure (or any other component of final output) in 1949 upon the intermediate output of Canadian industries and upon imports. In 1949 gross domestic investment, excluding investment in inventories, amounted to \$2,968 million. As can be seen from the entry in row 37 of column 47 of Table 1, \$1,645 million of this represented new construction and the remaining \$1,323 million comprised investment in machinery and equipment. Data published in Department of Trade and Commerce, *Private and Public Investment in Canada, Outlook 1951* (Ottawa, 1951), Tables 4-8, show how much expenditure was made by each industry. Column 47 of the inter-industry flow table (Table 1), on the other hand, contains an allocation of this amount according to the industries which produced the goods. For example, the entry in row 32 of column 47 says that, of the total expenditure on machinery and equipment of \$1,323 million, expenditure on the products of the electrical apparatus and supplies industry amounted to \$123 million. What were the repercussions of this expenditure on the inputs into the electrical apparatus industry and therefore on the intermediate output of other industries and upon imports?

It should be noted that the table does not distinguish which inputs into the electrical apparatus industry were used in making the products that entered into investment expenditure on machinery and equipment, or personal expenditure, or exports, or intermediate output, and so forth. This is because the basic unit of the table is the establishment and the table distinguishes only the inputs into an establishment and the products which came out of that establishment. If it were possible to distinguish the inputs relating to the various production processes within an establishment, this problem could be partially overcome. As long as joint production exists, however, the problem will exist. In the particular example that we are examining, a breakdown of the electrical apparatus group into its five component industries<sup>25</sup> might serve to further separate the effects of machinery and equipment expenditure. The possibility of making such

finer industrial classification may be investigated as part of further input-output research. At present, however, to trace the effects of investment expenditure upon inputs, it is necessary to make some assumption—for example, that the same inputs are used in the same proportion for all components of output.

As can be seen from Table 2, to produce one dollar's worth of output in 1949 the electrical apparatus industry used \$0.05 worth of input obtained from the non-ferrous metal products, n.e.s. industry (column 32, row 31), \$0.02 worth of input from the iron and steel products n.e.s. industry (column 32, row 28) and so forth. In turn, to produce a dollar's worth of output, the iron and steel products, n.e.s. industry used \$0.11 worth of input from the primary iron and steel industry (column 28, row 26). To produce a dollar's worth of output, the primary iron and steel industry used \$0.03 worth of input from the metal mining and non-ferrous metal smelting and refining industry group (column 26, row 4). In this manner it is possible to trace the effects of final expenditure through manufacturing to the extractive industries. It is emphasized, however, that some assumption about the relationship of specific inputs to specific outputs must be made. Proportionality is only one of many possible assumptions. Further research into industry input-output relationships may throw further light on these problems.

It is interesting to note that to produce a dollar's worth of output the iron and steel industry used \$0.01 worth of the output of the electrical apparatus and supplies industry (column 28, row 32). Thus, there is a feed-back effect on the electrical apparatus industry. To produce a dollar's worth of final output, an industry generally must also produce some intermediate output for use by other industries. In other words, by using inputs from other industries a demand for its own products is created.

As can be seen from this example, the present inter-industry flow table enables some analysis of the effects of changes in final output upon materials and services used. The table, however, suggests nothing about the relationship between output and capital. Problems such as the following are still left unanswered: (i) To what extent would changes in the quantity of input be met through inventory change rather than by current production? (ii) To what extent would an increase in output in an industry require an increase in plant and equipment, either in that or other industries? To answer these questions would require statistics on the physical stock of plant, equipment, and inventories and a theory relating changes in output to changes in the stock of capital equipment. The importance of inventory change will depend, of course, on whether the problem is one of the short-run or the long-run. In the long-run, the buffer effect of inventory change on the output of industries will disappear, whereas, in the short-run, changes in the quantity of input may be met by inventory change without causing a change in output of the industry which produces the input.

25. The D.B.S. Standard Industrial Classification lists the following industries within this group: heavy electrical machinery; radios and radio parts; refrigerators, vacuum cleaners and appliances; and miscellaneous apparatus and supplies.

**TABLE 4. The Inter-Industry Flow of Goods and Services by Broad Divisions of Industry, Canada, 1949**  
(purchasers' prices in millions of dollars)

No.	For the disposition of output of an industry read the row for that industry  For the industry of origin of input into an industry read the column for that industry	1	2	3	4	5
		Agriculture	Forestry, fishing, hunting and trapping	Mining, quarrying, and oil wells <sup>1</sup>	Manufacturing	Construction <sup>2</sup>
1	Agriculture .....	51.1	6.7	0.2	1,260.4	--
2	Forestry, fishing, hunting and trapping .....	0.4	1.1	--	492.5	11.4
3	Mining, quarrying, and oil wells <sup>1</sup> .....	1.3	--	21.1	245.6	28.7
4	Manufacturing .....	489.5	62.1	96.1	2,878.6	1,329.3
5	Construction <sup>2</sup> .....	33.3	6.0	16.6	64.2	2.7
6	Transportation, storage, and trade .....	519.0	18.6	240.0	2,560.3	23.6
7	Electricity, water, and gas utilities .....	2.5	0.2	35.5	103.3	5.7
8	Communication, finance, insurance, real estate, <sup>3</sup> and service industries <sup>4</sup> .....	104.2	2.5	14.6	347.6	71.6
9	Imports of goods and services <sup>5</sup> .....	26.1	2.3	46.7	1,583.1	111.9
10	Unallocated .....	26.8	88.6	57.1	709.4	158.2
11	<i>Total intermediate input (Rows 1+...+10).....</i>	<i>1,254.2</i>	<i>188.0</i>	<i>527.9</i>	<i>10,245.9</i>	<i>1,743.2</i>
12	Wages, salaries and supplementary labour income <sup>6</sup> .....	143.3	201.0	309.8	2,578.6	824.5
13	Corporation profits before taxes .....	2.3	58.8	225.7	929.9	46.9
14	Other income <sup>7</sup> .....	1,547.4	65.6	12.7	127.2	160.1
15	Indirect taxes less subsidies .....	10.5	28.3	15.5	1,041.0	19.9
16	Depreciation allowances and similar business costs .....	145.3	39.8	89.0	366.2	50.1
17	<i>Total primary input = gross domestic product at market prices (Rows 12+...+16) .....</i>	<i>1,848.8</i>	<i>393.7</i>	<i>652.7</i>	<i>5,042.9</i>	<i>1,101.5</i>
18	<i>Total input (Rows 1+...+10+17) .....</i>	<i>3,103.0</i>	<i>581.7</i>	<i>1,180.6</i>	<i>15,288.8</i>	<i>2,844.7</i>

1. The non-ferrous metal smelting and refining industry is included in this group.

2. The construction sector includes all new and repair construction, including construction put in place by the labour force of other industries.

3. All rented non-residential property and all residential dwellings, owned or rented, are included in this industry group.

4. The community, government, recreation, business, and personal service industries are included in this group.

The analysis of the effect of final output expenditure may be extended to include not only the effect on intermediate output but the effect on primary input<sup>26</sup>. While total gross domestic expenditure at market prices is identical with total gross domestic product at market prices, the tracing of these effects through the industrial structure provides information on the industrial distribution of the national income. For example, in which industries did the gross domestic product resulting from new expenditure on construction originate in 1949? Table 1 shows expenditure on new construction amounting to \$2,115 million (column 50, row 37), of which \$470 million was government expenditure

(column 46, row 37) and the remaining \$1,645 million was part of gross domestic investment expenditure (column 47, row 37). The table shows that the gross domestic product originating in the construction sector was \$1,102 million (column 37, row 52). Not all of this latter amount was a result of expenditure on new construction; expenditure on repair construction amounted to \$730 million (column 44, row 37). It might be assumed, therefore, that the primary input directly resulting from expenditure on new construction was proportional to the ratio of total new construction to total new and repair construction (\$2,115 million/\$2,845 million) x \$1,102 million = \$819 million.

26. The distinction between intermediate and primary input is made for accounting purposes and is not intended to correspond to a distinction between inputs whose ratio to total output may be stable and those for which the ratio may be unstable. Nor is the distinction between final output and intermediate output necessarily equivalent to a distinction between autonomous and induced demands for the output of industry.

In addition to this direct effect, primary input would result from the expenditure of the construction sector upon the output of other industries. For example, the entry in column 37, row 23 of Table 1 shows an input into the construction sector originating from the wood products industry amounting to \$320 million. The primary input into the wood



**TABLE 4. The Inter-Industry Flow of Goods and Services by Broad Divisions of Industry, Canada, 1949**  
(purchasers' prices in millions of dollars)

6	7	8	9	10	11	12	13	14	15	16	17	No.
Transportation, storage, and trade	Electricity, water, and gas utilities	Communication, finance, insurance, real estate, <sup>3</sup> and service industries <sup>4</sup>	Unallocated	Total intermediate output (Columns 1+...+9)	Personal expenditure on consumer goods and services	Government expenditure on goods and services	Gross domestic investment (ex inventories)	Change in inventories	Exports of goods and services <sup>5</sup>	Total final output (Columns 11+...+15)	Total output (Columns 1+...+9+16)	
10.8	--	53.8	98.6	1,481.6	965.1	32.0	7.7	-70.7	687.3	1,621.4	3,103.0	1
0.4	--	2.1	--	507.9	11.3	--	--	-38.7	101.2	73.8	581.7	2
49.5	13.4	36.8	13.0	409.5	148.2	--	--	11.5	611.4	771.1	1,180.6	3
476.0	49.5	883.7	460.9	6,725.7	5,782.7	54.5	740.3	161.8	1,823.8	8,563.1	15,288.8	4
194.0	23.8	389.5	--	730.0	--	469.7	1,645.0	--	--	2,114.7	2,844.7	5
95.2	2.7	104.0	189.0	3,752.4	558.2	2.7	19.7	--	159.4	740.0	4,492.4	6
34.0	92.3	75.2	0.8	349.5	124.9	--	--	--	4.8	129.7	479.2	7
386.1	3.5	454.3	95.8	1,480.2	3,007.3	1,569.3	--	--	1.7	4,578.3	6,058.5	8
110.5	4.1	65.3	306.6	2,256.6	669.8	--	501.2	-13.4	32.8	1,190.4	3,447.0	9
4.0	0.5	151.6	--	1,194.8	-420.3	--	--	22.8	502.5	105.0	1,299.8	10
1,360.5	189.8	2,216.5	1,166.1									11
1,784.9	79.6	1,954.2	--		--	--	--	--	--	--	7,875.9	12
414.4	35.4	192.8	--		--	--	--	--	--	--	1,906.2	13
554.7	91.5	1,001.6	--		--	--	--	--	--	--	3,560.8	14
95.8	22.1	289.7	133.7		116.0	--	54.1	0.1	3.1	173.3	1,830.0	15
282.1	60.8	403.7	--		--	--	--	--	--	--	1,437.0	16
3,131.9	289.4	3,842.0	133.7		116.0	--	54.1	0.1	3.1	173.3	16,611.0	17
4,492.4	479.2	6,058.5	1,299.8		10,963.2	2,128.0	2,968.0	73.4	3,928.0	20,058.0	55,386.6	18

5. The value of imports is estimated c.i.f. port of entry and the value of exports, f.o.b. port of exit.

6. Military pay and allowances of \$115.0 million are included in wages and salaries paid by the government service industry.

7. An inventory valuation adjustment is included in this item.

Components may not add exactly to totals because of rounding or because of the residual error of estimate in the National Accounts (\$3.0 million in 1949).

products industry resulting from this expenditure may be traced in a manner similar to that by which the effect of final expenditure on the output of the electrical apparatus industry was traced. To extend the analysis to include primary input would mean extending the assumption of proportionality (or some other appropriate assumption) to include primary inputs as well as intermediate inputs. By these methods, the gross domestic product resulting from the expenditure on new construction can be traced to the industry of origin<sup>27</sup>. The total gross domestic product will be equal to the amount of the

expenditure on new construction less the value of imported goods and services used in the construction sector or used in producing materials or services used by the construction sector. The increase in wages and salaries, profits, and other primary inputs will probably result in increased expenditure by persons on consumer goods, increased investment expenditure, and so forth. If the relationship between increases in income and increases in expenditure could be established, the effects of the induced increases in expenditure can be traced in a similar manner to that by which the effects of the original construction expenditure were traced.

27. The possibility of using an input-output table to trace the industrial distribution of gross domestic product resulting from a given final expenditure suggests the use of the table for checking the consistency of independent forecasts of gross domestic product and expenditure. The forecast industrial distribution of domestic product can be checked against the distribution derived by tracing the effects of the forecast expenditure through the input-output table. For this purpose the input ratios may either be assumed to remain constant or be changed where more current information is available.

The measurement of the import content of specific components of gross domestic expenditure may also be facilitated by the inter-industry flow table. In 1949 total imports of goods and services amounted to \$3,447 million (row 43, column 51). Of this \$501 million represented investment expenditure on imported investment goods (column 47, row 43 of Table 1). Approximately ten per cent of this

latter amount represented electrical machinery and equipment and may have competed directly with the electrical machinery and equipment produced by the domestic electrical apparatus industry. In addition to imports imported for use by final output categories which did not require further processing or assembly, intermediate input into Canadian industries of imported goods and services amounted to \$2,257 million (column 44, row 43). Of this, \$65 million was imported by the electrical apparatus industry (column 32, row 43). Included in this import figure were items such as glass bulbs, iron and steel pipe and sheets, alloy steel, radio parts, refrigerator parts, electric motors, bituminous coal (for fuel), and insurance and freight costs on these items to the Canadian border. It becomes apparent that the \$123 million worth of investment expenditure on machinery and equipment produced by the Canadian electrical apparatus industry (column 47, row 32) was, in part, indirect expenditure on imported goods and services. To determine how much again requires some assumptions. As explained above, the table does not distinguish how much of the imports went into goods produced for investment expenditure on machinery and equipment and how much went into other final output and into intermediate output. It might be assumed that the use of imports was proportional to the value of each component of total output. For example, from Table 3 it can be seen that investment expenditure on machinery and equipment comprised 19% of the total output of the electrical apparatus industry (column 47, row 32). The iron and steel industry used \$95 million worth of imported goods and services (column 28, row 43 of Table 1) and 1.3% of the output of this industry was used by the electrical apparatus and supplies industry (column 32, row 28 of Table 3). It might be assumed, therefore, in the absence of other information upon which to make this calculation, that 1.5% of the imports of the iron and steel industry could be allocated to the electrical apparatus industry and 19% of this amount could be allocated to machinery and equipment produced by the electrical apparatus industry. In this systematic manner the import content of each component of gross domestic expenditure might be determined.

It is possible to calculate a general solution relating changes in the level of final output to the resulting changes in the total output of each industry, assuming a constant ratio between the inputs into an industry and the output of the industry. This can be done by inverting a unit matrix minus the matrix of the ratios of intermediate input (excluding imports) to total output for each of the forty-two industries. The levels of specific inputs into an industry can then be calculated using the assumption that a constant ratio exists between the quantity used of a particular input and the total output for the industry. This general solution requires, however, a large number of multiplications. To invert a 42 x 42 matrix, for example, requires approximately 74,000 multiplications; electronic computers are usually used for these calculations.

A sufficient number of uses of the "inverse" must be foreseen in order to justify the cost of inverting the matrix. When only a few specific solutions are required it is usually cheaper to use the step-by-step (or "iterative" method) used in the above examples<sup>28</sup>. Although in theory there are an infinite number of calculations in such a procedure, the series, in fact, approach a limit very rapidly. Moreover, the iterative method has the advantage of allowing the user to incorporate into a solution the most recent data on inputs or substitution between imports and the products of domestic industries. In a developing economy this can be a very important advantage. It is also easier to take into account limits on productive capacity when using this method.

The presence of unallocated inputs and output, unfortunately, complicates both methods. For analytical uses it may be desirable to allocate these items by some mechanical process.

Another type of problem whose analysis may be facilitated by the use of an input-output table is the effect of price changes. What would happen to prices generally if the price of an imported material used in the electrical apparatus industry were to increase by 10%? To simplify the problem it might be assumed that this input is used in the production of all products produced by the electrical industry and that there is no substitute for it. In order to establish the increase in the total cost of this input, it would be necessary to know the proportion of this particular import to total imports used in the industry. The table does not give this information and so it would be necessary to estimate the proportion. If it were 50% of the total, then the cost of imports would rise by 0.10 (0.50 X \$65.0 million) = \$3.2 million (see column 32, row 43 of Table 1). Initially, therefore, the cost of this input would increase by this amount and would result either in a reduction in the amount paid for a primary input (wages or profits, for example) or the price of the products of the industry would increase. In the latter event, the effect on the cost structure of other industries could be traced in a manner similar to that by which the effect of investment expenditure was traced. At each link in the chain of repercussions the possible substitution effects and the possible direction of the effect, whether forward to output prices or backward to primary input costs would have to be examined. The effect may also depend on whether it is short-run or long-run changes that are being studied.

28. The two methods of solution are explained by Hollis Chenery in United States of America, Mutual Security Agency, *The Structure and Growth of the Italian Economy* (Rome, 1953), pp. 25-31. A more detailed discussion of computational problems is contained in two papers by W. Duane Evans: (i) "The Effect of Structural Matrix Errors on Interindustry Relations Estimates," *Econometrica*, XXII (Oct. 1954), 461-480 and (ii) "Input-Output Computations" in T. Barna (ed.), *The Structural Interdependence of the Economy* (New York: John Wiley & Sons, Inc., 1956), 53-102.



While an inter-industry flow table can only give numerical results when certain assumptions are made about the behaviour over time of the relationship of input to output for each industry, even without such assumptions the table provides a useful framework for qualitative analysis. As empirical knowledge of the behaviour of industry input, output, and prices increases, these interrelationships can be more effectively analyzed.

The uses suggested in this section all refer to general economic analysis. For this experimental inter-industry flow table it was not considered feasible to attempt to show commodity detail on the disposition of output. For this reason the table is not well-suited for market analysis. It does not enable one to say much about the total market for a particular commodity—which industries use it and whether it is expanding or contracting. Furthermore, the table shows nothing about the share of foreign suppliers and domestic producers in particular markets. When the proposed D.B.S. Standard Commodity Classification is implemented, production, export, and import statistics will be on a uniform classification system and commodity flow estimates for many commodities can then be made.

## 6. Some Characteristics of Different Industries

The percentage relationships shown in Tables 2 and 3 depict some of the different characteristics of Canadian industries. To facilitate description some of these characteristics are presented in a slightly different manner in Table 5.

In Table 5 the figure for total output of each industry excludes output of the industry which was used by establishments within the same industry. This net figure provides a measure of total **unduplicated output** for a particular industry. This adjustment is significant for industry groups where different stages in the production of a product have been grouped together within the same industry. For example, in the textile industry some establishments manufactured yarn which was used by other establishments to make fabrics. To arrive at the unduplicated output of the textile group this yarn is subtracted from total output. Another example of large intra-industry consumption is the tobacco industry where some establishments specialized in processing the raw tobacco into a semi-manufactured form which then was used by other establishments to manufacture cigarettes, cigars, and so forth. Similarly, within the wood products group, sawmills transformed logs into lumber and the lumber was used by other establishments to make wood products such as boxes, barrels, doors, flooring, etc.

An examination of **primary input** as a per cent of unduplicated output reveals some differences between industrial divisions. It will be noticed that in agriculture and the extractive industries, where very few intermediate inputs are used, the primary input (value added) amounts to about 60% of total unduplicated output with the exception of

the coal mining and crude petroleum group where the ratio is closer to 40%. In the latter group transportation costs incurred in delivering coal to the user were proportionately much higher and raise the proportion of intermediate input. The high ratio of value added in these industries reflects the fact that output is obtained by applying labour and capital to natural resources with very little use of other materials.

In the manufacturing industries on the other hand, where relatively large amounts of materials are used to manufacture other products, the ratio is much lower. In industries where there is a relatively simple transformation process, the cost of materials comprises a very high proportion of the value of total output. This is true, for example, in the meat products and grain mill products industries. In industries where a product is heavily taxed, value added is a high proportion of total output. This is particularly noticeable in the beverage and tobacco industries. In industries where a relatively complicated manufacturing process is involved, such as textile products, paper products, iron and steel products, and electrical apparatus, value added is about 40% of total output. In this respect the construction industry is very similar to manufacturing. In the various public utility, trade, and service industries, value added ranges from about 60% to 75% of total unduplicated output. In the public utility industries this reflects in part a relatively high use of capital equipment, whereas in the trade and services industries, wages and salaries comprise a large proportion of the value of total output.

Inventory change comprises a portion of final output which, although final for the period under consideration, becomes intermediate input in future periods. For some purposes it is useful to exclude this from the measure of final output and to subdivide final output into exports and domestic purchases. In agriculture and the extractive industries the **domestically purchased final output** includes mainly food; to this small extent, the fortunes of these industries are directly affected by consumer purchases rather than by the demands of other industries or foreign users. It can be seen that a number of manufacturing industries, on the other hand, produce almost entirely for domestic final purchasers. These include the bakery products, tobacco products, and clothing industries. Since the purchase by restaurants of food for use in preparing meals is classified as intermediate output, some of these final output percentages are lower than would otherwise be expected. At the other extreme are the wood products (exc. furniture), paper products, primary iron and steel, and non-metallic mineral products industries which produce either to meet the needs of other domestic industries or for export.

The treatment of trade margins as intermediate input into industry means that the purchase of the output of transportation, storage and trade group by domestic final purchasers is shown as being

TABLE 5. Primary Input, Final Output, Imports, and Exports as Per Cent of Total Unduplicated Output by Industry, Canada, 1949<sup>1</sup>

	Total unduplicated output <sup>2</sup> at purchasers' prices \$ million	Origin of Input				Disposition of Output			
		Primary input <sup>3</sup> as per cent of unduplicated output	Imported goods and services used as per cent of unduplicated output	Intermediate input obtained from domestic source as per cent of unduplicated output	Total input per cent	Domestically purchased final output (ex inventories) <sup>4</sup> as per cent of unduplicated output	Exports of goods and services as per cent of unduplicated output	Intermediate output plus inventory change as per cent of unduplicated output	Total output per cent
1. Agriculture .....	3,051.9	60.6	0.9	38.6	100.0	32.9	22.5	44.6	100.0
2. Forestry .....	450.5	68.5	0.1	31.4	100.0	--	12.1	87.9	100.0
3. Fishing, hunting and trapping .....	130.1	65.4	1.4	33.2	100.0	8.7	35.7	55.6	100.0
4. Metal mining and non-ferrous metal smelting and refining .....	691.6	62.0	6.6	31.4	100.0	--	81.4	18.6	100.0
5. Coal mining, crude petroleum and natural gas .....	366.1	43.4	0.2	56.4	100.0	40.5	0.9	58.6	100.0
6. Non-metal mining, quarrying, and prospecting .....	112.5	58.0	0.3	41.8	100.0	--	40.0	60.0	100.0
7. Meat products .....	751.5	10.8	2.3	86.9	100.0	75.0	11.9	13.2	100.0
8. Dairy products .....	440.1	15.6	0.8	83.6	100.0	77.5	7.0	15.5	100.0
9. Fish processing .....	139.3	21.5	1.4	77.0	100.0	28.9	53.4	17.7	100.0
10. Fruit and vegetable preparations .....	168.1	23.4	3.5	73.0	100.0	76.6	4.3	19.2	100.0
11. Grain mill products .....	448.3	8.6	3.2	88.2	100.0	15.8	25.4	58.8	100.0
12. Bakery products .....	278.0	30.5	3.0	66.4	100.0	91.4	0.1	8.5	100.0
13. Carbonated beverages .....	112.2	43.4	3.2	53.4	100.0	82.3	--	17.7	100.0
14. Alcoholic beverages .....	537.7	46.2	2.6	51.2	100.0	64.0	6.7	29.2	100.0
15. Confectionery and sugar refining .....	258.1	26.3	33.6	40.2	100.0	78.9	0.4	20.7	100.0
16. Miscellaneous food preparations .....	245.2	21.3	33.9	44.8	100.0	69.6	7.2	23.2	100.0
17. Tobacco and tobacco products .....	404.9	65.8	1.2	33.0	100.0	95.4	2.3	2.3	100.0
18. Rubber products .....	234.1	36.1	13.8	50.1	100.0	40.4	5.5	54.0	100.0
19. Leather products .....	246.8	43.6	11.8	44.6	100.0	86.9	3.1	10.0	100.0
20. Textile products (exc. clothing) .....	611.2	42.3	30.8	26.9	100.0	18.4	3.2	78.5	100.0
21. Clothing (textile and fur) .....	1,060.0	35.2	12.7	52.1	100.0	92.8	0.4	6.7	100.0
22. Furniture .....	246.1	36.0	4.8	59.1	100.0	87.0	0.2	12.7	100.0
23. Wood products (exc. furniture) .....	720.3	34.4	1.9	63.7	100.0	3.3	29.7	67.0	100.0
24. Paper products .....	1,073.2	39.0	4.4	56.6	100.0	4.8	60.8	34.4	100.0
25. Printing, publishing and allied industries .....	404.8	50.4	2.0	47.6	100.0	24.3	0.9	74.8	100.0
26. Primary iron and steel .....	313.6	40.4	15.5	44.1	100.0	--	13.5	86.5	100.0
27. Agricultural implements .....	187.3	36.7	10.0	53.3	100.0	42.1	51.3	6.6	100.0
28. Iron and steel products, n.e.s. ....	1,110.3	40.5	8.6	51.0	100.0	30.2	4.4	65.5	100.0
29. Transportation equipment .....	1,370.1	40.2	14.9	45.0	100.0	56.3	11.6	32.1	100.0
30. Jewellery and silverware (incl. watch repair) .....	94.3	27.5	8.2	64.4	100.0	83.9	3.1	13.0	100.0
31. Non-ferrous metal products, n.e.s. ....	233.5	32.3	4.8	62.9	100.0	10.5	10.8	78.7	100.0
32. Electrical apparatus and supplies .....	611.7	42.4	10.7	46.9	100.0	51.9	2.7	45.4	100.0
33. Non-metallic mineral products .....	301.5	41.5	8.9	49.5	100.0	9.0	6.9	84.0	100.0
34. Products of petroleum and coal .....	815.5	27.3	32.7	40.0	100.0	28.5	1.0	70.6	100.0
35. Chemicals and allied products .....	709.7	32.4	14.9	52.7	100.0	28.7	13.9	57.4	100.0
36. Miscellaneous manufacturing industries ..	222.3	45.0	10.4	44.5	100.0	54.2	4.4	41.3	100.0
37. Construction .....	2,842.0	38.8	3.9	57.3	100.0	74.4	--	25.6	100.0
38. Transportation, storage, and trade .....	4,397.2	71.2	2.5	26.3	100.0	13.2	3.6	83.2	100.0
39. Communication .....	294.5	70.1	0.1	29.8	100.0	42.7	--	57.3	100.0
40. Electricity, water, and gas utilities .....	386.9	74.8	1.1	24.1	100.0	32.3	1.2	66.5	100.0
41. Finance, insurance, and real estate .....	1,894.8	74.2	--	25.8	100.0	65.7	--	34.2	100.0
42. Service industries .....	3,605.0	61.9	1.8	36.4	100.0	88.9	0.1	11.0	100.0

1. A similar table for the United Kingdom in 1935 is published by T. Barna, "The Interdependence of the British Economy", *Journal of the Royal Statistical Society*, Series A, CXV (1952), 57. (A comparison of the two tables reveals some interesting differences between the foreign trade of the two economies.)

2. Total output less intra-industry consumption.

3. Gross domestic product at market prices originating in the industry.

4. Personal expenditure on consumer goods and services, government expenditure on goods and services, and gross domestic investment (ex inventories).

rather small. The fact that the final output sector "government expenditure on goods and services" is shown as purchasing all the output of the government service industry (included in the service industry group) accounts for the fact that such a large per cent of the output of this group is shown as final domestic purchases.

A number of Canadian industries export over 10% of their total unduplicated output. In 1949 these included agriculture and the extractive industries with the exception of the coal mining, crude petroleum and natural gas group. Included in the exports of the metal mining industry is \$139 million worth of gold production available for ex-

port. The principal manufacturing exporters are industries such as the meat products, fish processing, and grain mill products industries, which process agricultural or fishery products not easily transportable long distances. A large proportion of the products of Canadian forests are exported either as lumber or as newsprint and pulp. The latter industry is of course a result not only of Canada's forest wealth, but of the abundant sources of hydroelectric power. The primary iron and steel and non-ferrous metal product industries export various fabricated materials. Only in the agricultural implements and transportation equipment industries did the export of manufactured end products in 1949 exceed 10% of total unduplicated output.



The chemical industry is an example of one of the few industries which had a significant two-way relationship with international trade. The imports into the industry include phosphate rock, potash, copra, soy beans, various chemicals and hydro-carbon feedstocks. From these materials it manufactured products such as mixed fertilizers, ammonia and phosphate, processed oils and greases, and synthetic rubber, part of which it exported. The non-ferrous metal smelting and refining industry imports bauxite and various concentrates and exports aluminum and other non-ferrous fabricated materials. Hydro-electric power again is an important factor in this industry. Another industry which had a two-way relationship with foreign trade in 1949 is the primary iron and steel industry, which imported iron ore and exported semi-finished rolled forms, rails, and ferro-alloys. Although the transportation equipment group appears to have a similar two-way relationship, in fact many of the imports were for use in the motor vehicle industry, whereas the exports were produced by the aircraft, railroad equipment, and shipbuilding industries.

Industries which used large quantities of imported materials included the confectionery and sugar refining industry, which imported cocoa beans and butter, nuts, and raw cane sugar; the miscellaneous food preparations industry which imported coffee beans, tea, rice, raisins, and corn; the textile industry which imported raw cotton, grey cotton goods, wool, sisal, jute cloth, and nylon salt; and the clothing industry which imported furs and skins and various piece goods. In 1949 the products of petroleum and coal industry was importing substantial quantities of crude oil and bituminous coal.

It can be seen that many industries have a one-sided direct relationship with foreign trade in the sense that they are either significant exporters or significant users of imported goods and services<sup>29</sup>. Consequently, the immediate effect of changes in the price levels in foreign markets upon exporting industries and industries using imported goods and services will tend to be diffused through the Canadian economy in different directions. A general rise in prices will tend to mean increased revenue for exporters but increased costs for importers. This will have repercussions on the distributions of incomes (including profits) and will spread to other industries through the purchase and sale of intermediate output. Even though some industries such as bakery products, printing and publishing, and the service industries have little direct contact with foreign purchasers or supplies, almost all industries are connected to foreign markets through being suppliers of materials and services to export industries or through using materials and services which have an import content.

In analyzing Canada's foreign trade in 1949 certain factors affecting this trade must be kept in

mind. In November of 1947 to conserve the use of United States dollars, the Canadian government introduced the Emergency Exchange Conservation Act which restricted imports from the United States and certain other countries not known to be short of United States dollars. This act prohibited the import of a variety of consumer goods and placed a variety of consumer goods under quota and, in addition, certain capital goods and production materials were admitted on a selective basis. During 1948 the number of items in these categories was increased but at the beginning of each quarter in 1949 some of the restrictions were relaxed. The easing of restrictions continued through 1950 and the last of the restrictions was removed on December 31, 1950.

During most of the first three quarters of 1949 the Canadian and United States dollars were at par. In September, however, a buying rate for United States dollars of \$1.10 was established and maintained for the balance of the year. The average rate for the year was therefore \$1.03.

During 1949 an inventory adjustment occurred in the United States, but not in Canada. This resulted in a reduced volume of exports to the United States in the first three-quarters of the year but exports increased sharply in the fourth quarter. The devaluation of the Canadian dollar, as well as a recovery of United States demand, led to this fourth quarter increase. Imports into Canada from the United States were strong in the first part of 1949 because of the relaxation of some of the provisions of the Emergency Exchange Conservation Act and the sustained economic activity in Canada. Imports weakened in the latter part of the year, however, because of devaluation and because of steel and coal strikes in the United States. In so far as the use of imported goods was sustained through drawing on stock piles (for example, coal), the import use figures in Table 4 do not fully reflect this decline in imports.

## 7. Statistical Methods

The work of assembling the 1949 table of the inter-industry flow of goods and services was divided into four parts: (i) definition and measurement of the output of the forty-two industries in the table (the first forty-two totals in the right hand column and in the bottom row of the table), (ii) estimation of the allocation of the intermediate inputs into each industry by industrial source (quadrangle I—the first forty-four figures in each of the first forty-two columns of the table), (iii) estimation of the distribution of final output by industrial sources (quadrangles II and IV—the figures in columns 45 to 49), and (iv) the estimation of the distribution of primary input into each industry (quadrangle II—the figures in rows 46 to 48 and 50 to 51 of the first 42 columns). Customs import duties (row 49) were allocated at the same time as imports. Although these parts of the work were interrelated, as far as possible the estimation of each part proceeded independently. Once estimates of total output, intermediate input, final output, and primary input

29. Some industries may also be in competition with imported goods. This aspect of foreign trade is not touched upon in this study.

were made, all cells in the table (except the unallocated column) were filled in; that is, the table was assembled by filling in the figures for each column in the table. The consistency of the disposition of output figures (including the residual unallocated output) obtained by this method was then examined and changes made in input figures until the table balanced and met all the consistency checks that were applied. The reader is referred to the Appendix for a detailed description of the classification, sources, and methods<sup>30</sup>.

## 8. The Quality of the Estimates

The value of input into an industry was defined to be identical with the value of output of that industry. If total input could have been estimated independently of the estimate of total output, the discrepancy between the two estimates would have provided an indicator of the accuracy of the data comparable to the residual error of estimate in the National Accounts. Since recent data on such inputs into manufacturing as property taxes, professional fees, office supplies, rent, telephone, telegraph, and so forth, were unavailable, the total of such inputs into each manufacturing industry was estimated residually by subtracting the total value of all other inputs from the value of total output of the industry (see pp. 39 of the Appendix). Since total input for most industries was not estimated independently of total output, the main check on accuracy which a balancing set of accounts provides was not available for the 1949 inter-industry study.

A second important limitation on the balancing of the table was the difficulty of estimating the distribution costs and indirect taxes which comprise the "spread" between producers' and purchasers' prices. The result was that for commodity-producing industries the spread portion of the total output figure at purchasers' prices may be subject to a large margin of error. In some cases it was assumed that, where the independently estimated components of output did not add to the total output for the industry, the error was in the estimate of spread and this component of the total output estimate adjusted accordingly. The total spread for each industry is shown in Table 8 on page 29.

Because of these two problems, there are no separate figures for the residual errors of estimate of input and output. The unallocated input row contains the figure for unspecified materials and services used in the industry and the unallocated column contains mainly products which were not sufficiently identified on the Census schedules to determine their use. Further explanation of some of the entries in these unallocated cells may be found in the Appendix, pp. 43.

30. One of the most detailed descriptions of the methodological problems involved in constructing an input-output table is contained in National Bureau of Economic Research, Conference in Research in Income and Wealth, *Input-Output Analysis: Technical Supplement* (New York: National Bureau of Economic Research, 1954).

The estimates for some sectors of the table were made before the results of the 1951 Census of Canada were available. For example, some of the figures taken from the D.B.S. *National Accounts: Income and Expenditure, 1926-1950* (Ottawa, 1952) are on the basis of the 1941 Census. Since 1951 is much closer to 1949, the 1951 figures will provide a better basis for the 1949 estimates. As a result there may be some inconsistencies in the table until all estimates are revised in the light of the 1951 Census. When the revised National Accounts figures for 1949 become available, it will be possible to revise the figures in the inter-industry flow table and remove these inconsistencies.

It is clear from the detailed description of sources and methods given in the Appendix that the error of the estimates of the 1949 inter-industry flow table cannot be calculated quantitatively. A qualitative rating has been given to the estimates, however, despite the fact that it was difficult to always give a clear-cut classification to an estimate in a cell of the table since the figure may be the sum of several estimates of varying quality. Some inputs from manufacturing into manufacturing, for example, are the sum of fairly accurate estimates of the industry of origin of materials used plus less reliable estimates of the industry of origin of repair expenditure on machinery and equipment. It was decided, therefore, to classify by three broad categories: A, B, and C.<sup>31</sup> The criteria for classifying an estimate into one of these categories are:

- A: The basic data were collected on a survey such as the Census of Industry or were obtained from published accounting statements, and very little adjustment was required to translate the data into an industry-of-origin classification. Materials used for manufacturing industries are a typical example.
- B: The basic data were collected on a survey or from accounting statements but it was more difficult to translate them into an industry-of-origin classification. The "commodity flow" estimates of personal expenditure on consumer goods at producers' prices, for example, were given this classification.
- C: The estimates were inferred from inadequate basic data or from data which were in such a form that it was very difficult to translate into an industry-of-origin classification. An example of the former are the inputs from service industries into manufacturing; an example of the latter are the inputs into government service.

The total output figure (and total input figure) for most commodity-producing industries has been

31. Some general comments on the problem of the reliability of estimates in input-output tables are made by Stanley Lebergott, "Measurement for Economic Models," *Journal of the American Statistical Association*, XLIX. (June, 1954), 211-13. See also Oskar Morgenstern, *On the Accuracy of Economic Observations* (Princeton, N.J., 1950), esp. 37-44.



given a rating of A (or B) + C to indicate that the estimates are the sum of two separate estimates and that the quality of the producers' price component is better than the quality of the estimate

that was added to bring the total to purchasers' prices. A similar rating procedure was used for estimates of the disposition of industry output made by the "commodity flow" method.

TABLE 6. The Quality of Estimates of the Inter-Industry Flow of Goods and Services, 1949

	Agriculture	Forestry	Fishing and mining	Manufacturing	Construction	Other industries	Personal expenditure on consumer goods and services	Government expenditure on goods and services	Gross domestic investment (ex inventories)	Change in inventories	Exports of goods and services	Total output
Agriculture .....	B	C	B	A	...	C	B+C	B	B+C	C	A	A+C
Forestry .....	B	C	B	A	B+C	C	C+C	...	...	C	A	B+C
Fishing and mining .....	B	C	B	A	B+C	C	C+C	...	...	C	A	A+C
Manufacturing .....	B	C	B	A <sup>1</sup>	B+C	C	B+C	C+C	B+C	C	A	A+C
Construction .....	A	A	A	A	A	A	...	A	A	...	...	A
Other industries .....	C	C	C	C	C	C	C	A	C	C	B	B
Imports of goods and services .....	B	B	B	A <sup>1</sup>	A	C	B	C	B	C	A	
Wages, salaries and supplementary labour income .....	A	B	A	A	B	B	...	...	...	...	...	
Corporation profits before taxes .....	B	B	B	B	B	B	...	...	...	...	...	
Other income .....	B	B	B	B	B	B	...	...	...	...	...	
Customs import duties .....	B	B	B	A	A	C	B	C	B	C	B	
Other indirect taxes less subsidies ....	C	C	C	C	C	C	C	C	C	C	...	
Depreciation allowances and similar business costs .....	B	B	B	B	B	B	...	...	...	...	...	

1. Within the manufacturing group C's instead of A's should be given to the clothing, transportation equipment, non-metallic mineral products, and miscellaneous manufacturing industries because some components of these industries did not report data on materials used.

## 9. Select Bibliography

Articles appearing in books devoted mainly to inter-industry studies are not listed separately in this bibliography. These books are indicated by an asterisk.

A complete bibliography to March, 1955 is published by V. Riley and R.L. Allen, *Inter-industry Economics Studies*, Bibliography Reference Series, No. 4 Baltimore: Johns Hopkins University Press, 1955.

1. Barna, Tibor. "The Interdependence of the British Economy," *Journal of the Royal Statistical Society*, Series A, CXV (1952), 29-77.
2. Barna, Tibor. "The Educational Value of Input-Output Analysis," *Summaries of Lectures Delivered at the Statistical Seminar Held at Rome September, 1953*. The Hague: International Statistical Institute, 1955, pp. 74-77.
- \*3. Barna, Tibor. (ed.) *The Structural Interdependence of the Economy*. Proceedings of an International Conference on Input-Output Analysis, Varenna, Italy, June-July, 1954. New York: John Wiley and Sons, Inc., 1956.
4. Barnett, Harold J. "Specific Industry Output Projections," in National Bureau of Economic Research, Conference on Research in Income and Wealth, Studies in Income and Wealth, Vol. XVI. *Long-Range Economic Projections*. Princeton, Princeton University Press, 1954, pp. 191-226.
5. Bishop, R.A. "Input-Output as a Basis for Development Planning," *Monthly Bulletin of Agricultural Economics and Statistics*, V, No. 5 (May, 1956), 1-10.

6. Borch, Karl. "Input-Output Analysis as a Basis for Productivity Measurement," *Productivity Measurement Review*, May, 1955, pp. 5-11.
7. Boudeville, J.R. "Leontief et l'étude du circuit économique," *Revue économique*, IV (Nov. 1953).
8. Bowman, R.T. and Phillips, A. "The Capacity Concept and Induced Investment," *Canadian Journal of Economics and Political Science*, XXI (May, 1955), 190-203.
9. Burtle, James. "Input-Output Analysis as an Aid to Manpower Policy," *International Labour Review*, LXV (May, 1952), 600-625.
10. Cameron, Burgess. "The Construction of the Leontief System," *Review of Economic Studies*, XIX (1950-51), 19-27.
11. Cameron, Burgess. "The Labour Theory of Value in Leontief Models," *Economic Journal*, LXII (Mar., 1952), 191-197.
12. Cameron, Burgess. "The Production Function in Leontief Models," *Review of Economic Studies*, XXI (1952-53), 62-69.
13. Cameron, Burgess. "Input-Output Analysis," *Economic Record*, XXX (May, 1954), 33-43.
14. Cameron, Burgess. "The Future of Inter-Industry Analysis," *Economic Record*, XXXI (Nov., 1955), 232-241.
15. Cao-Pinna, Vera. *Notes introductives à l'étude et l'application de la méthode input-output*. Turin: Institut universitaire d'études européennes, 1955.
16. Chabert, Albert. "Le système d'input-output de Wassily Leontief et l'analyse économique quantitative," *Économie appliquée*, III (1950), 173-205.
17. Chenery, Hollis B. "The Role of Industrialization in Development Programs," *American Economic Review*, XLV, No. 2 (May, 1955), 40-57.
18. Cornfield, J., Evans, W.D., and Hoffenberg, M. "Full Employment Patterns, 1950," *Monthly Labour Review*, LXIV (1947), 163-190 and 420-432.
19. Dorfman, Robert. "The Nature and Significance of Input-Output," *Review of Economics and Statistics*, XXXVI (May, 1954), 121-133.
20. Ellsworth, P.T. "The Structure of American Foreign Trade: A New View Examined," *Review of Economics and Statistics*, XXXVI (Aug., 1954), 279-285.
21. Evans, W. Duane and Hoffenberg, Marvin. "The Interindustry Relations Study for 1947," *Review of Economics and Statistics*, XXXIV (May, 1952), 97-142.
22. Evans, W. Duane. "Marketing Uses of Input-Output Data," *Journal of Marketing*, XVII (July, 1952), 11-21.
23. Evans, W. Duane. "The Effect of Structural Matrix Errors on Inter-industry Relations Estimates," *Econometrica*, XXII (Oct., 1954), 461-480.
24. Fox, Karl A. and Norcross, Harry C. "Some Relationships between Agriculture and the General Economy," *Agricultural Economics Research*, IV (Jan., 1952), 13-21.
25. Fuerst, E. "The Matrix as a Tool in Macro-accounting," *Review of Economics and Statistics*, XXXVII (Feb., 1955), 35-47.
26. Georgescu-Roegen, Nicholas. "Leontief's System in the Light of Recent Results," *Review of Economics and Statistics*, XXXII (Aug., 1950), 214-222.
27. Gilbert, Milton, and Stone, Richard. "Recent Developments in National Income and Social Accounting," *Accounting Research*, V (Jan., 1954), 1-31.
28. Grasberg, Eugene. "Social Accounts and Input-Output Tables," *Accounting Research*, VI (Oct., 1955), 303-309.
29. Hurwicz, Leonid. "Input-Output Analysis and Economic Structure," *American Economic Review*, XLV (Sept., 1955), 626-636.
30. Isard, Walter. "Interregional and Regional Input-Output Analysis: A Model of a Space Economy," *Review of Economics and Statistics*, XXXIII (Nov., 1951), 318-328.
31. Isard, Walter. "Regional Commodity Balances and Interregional Commodity Flows," *American Economic Review*, XLIII, No. 2 (May, 1953), 167-180.
32. Isard, Walter and Freutel, Guy. "Regional and National Product Projections and their Interrelationships," in National Bureau of Economics Research, Conference on Research in Income and Wealth, Studies in Income and Wealth, Vol. XVI *Long-Range Economic Projections*. Princeton, Princeton University Press, 1954, pp. 427-471.
33. Klein, L.R. "On the Interpretation of Professor Leontief's System," *Review of Economic Studies*, XX (1952-53), 131-136.
- \*34. Koopmans, T.C. (ed.). *Activity Analysis of Production and Allocation*. Cowles Commission Monograph No. 13, New York: John Wiley and Sons, Inc., 1951.



35. Kravis, Irving B. "Wages and Foreign Trade," *Review of Economics and Statistics*, XXXVIII (Feb., 1956), 14-30.
36. Kuenne, Robert. "Walras, Leontief, and the Interdependence of Economic Activities," *Quarterly Journal of Economics*, LXVIII (Aug., 1954), 323-354.
37. Leontief, W.W. *The Structure of American Economy, 1919-1939: An Empirical Application of Equilibrium Analysis*. Second Edition, enlarged. New York: Oxford University Press, 1951.
- \*38. Leontief, W.W. (ed.). *Studies in the Structure of the American Economy: Theoretical and Empirical Explorations in Input-Output Analysis*. New York: Oxford University Press, 1953.
39. Leontief, W.W. "Domestic Production and Foreign Trade: The American Capital Position Re-Examined," *Proceedings of the American Philosophical Society*, XCVII (Sept., 1953), 332-349.
40. Lomax, K.S. "Allocation and Programming in Modern Economics," *Transactions of the Manchester Statistical Society*, Dec. 10, 1952.
41. Maillet, Pierre. "Une étude d'économie synthétique: le modèle de Leontief," *Revue d'économie politique*, LX Nov.-Dec., 1950), 669-693.
- ✓ 42. Moore, F.T. "Regional Economic Reactions Paths," *American Economic Review*, XLV, No. 2 (May, 1955), 133-148.
43. Moore, F.T. and Petersen, J.W. "Regional Analysis: An Interindustry Model of Utah," *Review of Economics and Statistics*, XXXVII (Nov., 1955), 368-383.
- \*44. Morgenstern, Oskar (ed.). *Economic Activity Analysis*. New York: John Wiley & Sons, Inc., 1954.
45. Moses, L.N. "Interregional Input-Output Analysis," *American Economic Review*, XLV (Dec., 1955), 803-832.
- \*46. National Bureau of Economic Research, Conference on Research in Income and Wealth. *Studies in Income and Wealth*, Vol. XVIII. *Input-Output Analysis: An Appraisal*. Princeton: Princeton University Press, 1955.
- \*47. National Bureau of Economic Research, Conference on Research in Income and Wealth. *Input-Output Analysis: Technical Supplement*. New York: National Bureau of Economic Research, 1954.
- \*48. Netherlands Economic Institute. *Input-Output Relations*. Proceedings of a Conference on Inter-Industrial Relations Held at Dreibergen, Holland, September, 1950. Leiden: H.E. Stenfert Kroese N.V., 1953.
49. Rasmussen, P. Norregaard. *Studies in Inter-Sectoral Relations*. Amsterdam: North-Holland Publishing Company, 1956.
50. Sawyer, John A. "The Measurement of Inter-Industry Relationships in Canada," *Canadian Journal of Economics and Political Science*, XXI (Nov., 1955), 480-497.
51. Steinthorson, D.H. "Notes on Inter-Industry Studies," *Canadian Journal of Economics and Political Science*, XXI (Nov., 1955), 533-534.
52. Stone, Richard. "Simple Transaction Models, Information and Computing," *Review of Economic Studies*, XIX (1951-52), 67-84.
53. Swerling, Boris. "Capital Shortage and Labor Surplus in the United States," *Review of Economics and Statistics*, XXXVI (Aug., 1954), 286-289.
54. United States of America, Mutual Security Agency, Special Mission to Italy for Economic Cooperation. *The Structure and Growth of the Italian Economy*. Rome, 1953.
55. Valavanis-Vail, Stefan. "Leontief's Scarce Factor Paradox," *Journal of Political Economy*, LXII (Dec., 1954), 523-528.
56. Waugh, Frederick V. "Inversion of the Leontief Matrix by Power Series," *Econometrica*, XVIII (April, 1950), 142-154.

# APPENDIX

## NOTES ON CLASSIFICATION, SOURCES, AND METHODS

Since the inter-industry flow table is in part an extension of the National Accounts, the concepts, sources, and methods for those Accounts also apply to this table. These have not been repeated in full and the reader is referred to D.B.S., *National Accounts, Income and Expenditure, 1926-1950*, (Ottawa, 1952), Part II for a fuller description. (In these notes this publication will be referred to as the *National Accounts*.)

### A. DEFINITION AND MEASUREMENT OF INDUSTRY OUTPUT

As was explained in the section on concepts, the industries in the table, with certain modifications that are explained below, are aggregations of industries defined in the Bureau's *Standard Industrial Classification Manual*. Table 7 shows the groupings used.

TABLE 7. Industrial Classification For the 1949 Table of Inter-Industry Flow of Goods and Services

	D.B.S. Standard Industrial Classification Code No.
1. Agriculture .....	000-079
2. Forestry .....	080-089
3. Fishing, hunting and trapping .....	091-097
4. Metal mining and non-ferrous metal smelting and refining .....	101-119, 345
5. Coal mining, crude petroleum and natural gas .....	121-126
6. Non-metal mining, quarrying, and prospecting .....	131-133, 139, 179
7. Meat products .....	200
8. Dairy products .....	201-209
9. Fish processing .....	210
10. Fruit and vegetable preparations .....	212
11. Grain mill products .....	213-216
12. Bakery products .....	218-219
13. Carbonated beverages .....	220
14. Alcoholic beverages .....	221-224
15. Confectionery and sugar refining .....	225, 227
16. Miscellaneous food preparations .....	228
17. Tobacco and tobacco products .....	230
18. Rubber products .....	236, 239
19. Leather products .....	241-249
20. Textile products (exc. clothing) .....	251-269
21. Clothing (textile and fur) .....	270-279
22. Furniture .....	286
23. Wood products (exc. furniture) .....	281-285, 287-289
24. Paper products .....	292-299
25. Printing, publishing and allied industries .....	301-309
26. Primary iron and steel .....	325
27. Agricultural implements .....	311
28. Iron and steel products, n.e.s. ....	312-324, 326-329
29. Transportation equipment .....	330-339
30. Jewellery and silverware (incl. watch repair) .....	343, 346
31. Non-ferrous metal products, n.e.s. ....	341, 342, 347, 349
32. Electrical apparatus and supplies .....	351-359
33. Non-metallic mineral products .....	137, 361-369
34. Products of petroleum and coal .....	373-379
35. Chemicals and allied products .....	380-389
36. Miscellaneous manufacturing industries .....	391-399
37. Construction <sup>1</sup> .....	404-439
38. Transportation, storage, and trade .....	501-527 701-799
39. Communication .....	543-549, 914
40. Electricity, water, and gas utilities .....	602-609
41. Finance, insurance, and real estate <sup>2</sup> .....	802-809
42. Service industries <sup>3</sup> .....	901-911, 916-949

1. The construction sector includes all new and repair construction activity, whether performed by the construction industry or the labour force of other industries.

2. The real estate industry includes all residential property, owned or rented, and all rented non-residential property.

3. The community, government, recreation, personal, and business service industries are included in this industry group.



**TABLE 8. Reconciliation of Total Output Figures Published by Other D.B.S. Divisions for Commodity-Producing Industries with those Used for the Inter-Industry Flow Study, 1949**  
(millions of dollars)

Industry	Total output figures published by other D.B.S. divisions	Net adjustment made for the inter-industry flow table	Total output at producers' prices	Distribution costs paid to other industries plus indirect taxes less subsidies	Total output at purchasers' prices
1. Agriculture .....	2,810.7	- 192.3	2,618.4	484.6	3,103.0
2. Forestry .....	561.4	- 115.8	445.6	4.9	450.5
3. Fishing, hunting and trapping .....	1	...	117.8	13.4	131.2
4. Metal mining and non-ferrous metal smelting and refining .....	1	...	661.0	40.0	701.0
5. Coal mining, crude petroleum and natural gas....	189.6	- 14.0	175.6	191.5	367.1
6. Non-metal mining, quarrying, and prospecting....	109.4	- 11.4	98.0	14.5	112.5
7. Meat products .....	711.0	- 5.0	706.0	93.2	799.2
8. Dairy products .....	441.2	- 2.6	438.6	14.5	453.1
9. Fish processing .....	112.0	+ 13.3	125.3	14.3	139.6
10. Fruit and vegetable preparations .....	148.8	- 1.6	147.2	25.0	172.2
11. Grain mill products .....	463.6	- 34.2	429.4	47.4	476.8
12. Bakery products .....	263.4	--	263.4	14.6	278.0
13. Carbonated beverages .....	85.6	- 0.1	85.5	32.6	118.1
14. Alcoholic beverages .....	227.9	+ 1.3	229.2	314.8	544.0
15. Confectionery and sugar refining .....	216.2	- 1.4	214.8	55.5	270.3
16. Miscellaneous food preparations .....	212.9	+ 1.2	214.1	34.2	248.3
17. Tobacco and tobacco products .....	172.4	+ 0.4	172.8	276.3	449.1
18. Rubber products .....	178.5	- 0.3	178.2	57.5	235.7
19. Leather products .....	210.8	+ 19.5	230.3	67.5	297.8
20. Textile products (exc. clothing) .....	636.8	+ 1.6	638.4	87.3	725.7
21. Clothing (textile and fur) .....	727.5	+ 28.7	756.2	320.0	1,076.2
22. Furniture .....	157.1	+ 8.2	165.3	83.6	248.9
23. Wood products (exc. furniture) .....	683.2	- 53.4	629.8	162.6	792.4
24. Paper products .....	1,093.1	- 1.8	1,091.3	123.8	1,215.1
25. Printing, publishing and allied industries .....	377.9	- 1.6	376.3	56.5	432.8
26. Primary iron and steel .....	305.7	+ 15.3	321.0	24.0	345.0
27. Agricultural implements .....	177.0	- 2.1	174.9	12.5	187.4
28. Iron and steel products, n.e.s. ....	936.4	- 2.7	933.7	231.8	1,165.5
29. Transportation equipment .....	1,063.2	+ 71.9	1,135.1	329.3	1,464.4
30. Jewellery and silverware (incl. watch repair)....	50.8	+ 2.9	53.7	47.9	101.6
31. Non-ferrous metal products, n.e.s. ....	217.1	- 2.0	215.1	40.4	255.5
32. Electrical apparatus and supplies .....	486.3	- 2.0	484.3	156.3	640.6
33. Non-metallic mineral products .....	246.5	+ 0.5	247.0	66.3	313.3
34. Products of petroleum and coal .....	533.7	+ 22.8	556.5	293.2	849.7
35. Chemicals and allied products .....	587.4	+ 3.0	590.4	177.3	767.7
36. Miscellaneous manufacturing industries .....	156.4	+ 16.9	173.3	51.5	224.8
37. Construction .....	2,844.7	...	2,844.7	...	2,844.7
40. Electricity, water, and gas utilities .....	1	...	478.4	0.8	479.2

1. No comparable figure is published by the Dominion Bureau of Statistics.

Output was measured at purchasers' prices for the inter-industry flow table. That is, to the value f.o.b. farm, forest, mine, factory, and so forth, was added an estimate of transportation and storage costs, trade margins, and other distribution costs, plus federal excise taxes and duties and provincial and municipal sales taxes less subsidies to arrive at the delivered value at the user's site. The notes which follow in this Section for commodity-producing industries refer to the measurement of output at producers' prices. An explanation of the methods used to arrive at purchasers' prices may be found in Sections B,C, and D. Table 8 reconciles the

total output figures published by other D.B.S. Divisions for commodity-producing industries with the producers' value figures used in arriving at total purchasers' value for the inter-industry table and shows the amount added to bring the value to purchasers' prices.

#### 1. Agriculture

Agricultural output is measured by the gross income from farming operations accruing to farm operators. Farming operations are defined to include the sale of logs cut from forests on farm

property and the income from fur farming. The components of gross farm income are (i) accrued income from the sale of farm products (excluding sales to farmers within the same province), (ii) income in kind, and (iii) the value of the physical change in inventories of live stock and grain on farms and grain in the Wheat Board or other commercial channels. (The Canadian Wheat Board is classified in the agriculture sector).

An estimate for gross income of farm operators from farming operations for 1949, \$2,810.7 million, was obtained from D.B.S. Reference Paper 25, *Handbook of Agricultural Statistics*, Part II, page 14. To this was added an estimate of \$4.0 million for gross income of Newfoundland. For the inter-industry study, all rental activity was classified in the real estate industry so that the amount of house rent, \$100.3 million, was deducted from farm income and included as real estate industry income. To conform with the definition of accrued net income of farm operators from farm production used in the National Accounts an adjustment on grain transactions was made. The adjustment for grain transactions, a deduction of \$96.0 million, takes account of the undistributed earnings (net of adjustment payments) of the Canadian Wheat Board and also adjusts for the fact that current earnings of this agency are calculated on the basis of the change in book values of inventories, whereas the required valuation of inventories is the value of physical change. (See Table 40 of the *National Accounts*.) Thus the total output of agriculture at producers' price was estimated as \$2,618.4 million.

## 2. Forestry

The output of the forestry industry is defined to include all forest products (sawlogs, plupwood, fuelwood, poles, and so forth) cut in Canadian forests during the year. From D.B.S. *Operations in the Woods: Final Estimates of Forest Production* was obtained an estimate of \$561.4 million. This figure is obtained by adding reported or estimated consumption in wood-using industries plus exports less imports. To arrive at the value of forest production it was necessary (i) to adjust for inventory change at all levels of distribution, (ii) to subtract the value of forest products included in farm income, and (iii) to convert from purchasers' prices to producers' prices.

## 3. Fishing, Hunting and Trapping

### (a) Fishing

From D.B.S. *Fisheries Statistics of Canada, 1949 and 1950* the figure for total unduplicated value of fishery products marketed was obtained. To this was added an estimate of Newfoundland production for 1949. From this total the estimate for the production of the fish processing industry was subtracted, and the fish processing industry's use of fish produced by the primary fishing indus-

try at producers' prices added, to arrive at the total output of the primary fishing industry.

### (b) Hunting and trapping

The D.B.S. report *Fur Production* gives the value of fur-pelts obtained from wild life. This report is published for the fur season; an adjustment was made to convert these figures to calendar year estimates.

## 4. Mining, Quarrying, and Oil Wells

The D.B.S. publication *General Review of the Mining Industry, 1949* contains figures for the gross value of production of industries in this group. In general these figures are obtained by adding the total production of commodities; thus, they measure the total production of minerals rather than the output of mining establishments. Special treatment was adopted in the following cases:

### (a) Metal mining and non-ferrous metal smelting and refining

Because of the integrated nature of some companies in the metal mining and non-ferrous metal smelting and refining industries, it was not possible to separate manufacturing from mining operations for the inter-industry flow study. The gross value of production of this industry was defined, therefore, to be the unduplicated gross value of metallic mineral production plus other products by establishments in the non-ferrous metal smelting and refining industry plus the income of contract diamond drillers. As is explained below for manufacturing industries, a change in goods in process adjustment was made for the non-ferrous metal smelting and refining industry.

The gross value of production figure for the gold mining industry is composed of two parts: (i) for alluvial gold mining it is the gross value of alluvial products; (ii) for auriferous quartz mining it is the value of bullion produced plus value of ore, concentrates, etc. shipped.

All production figures were brought to an f.o.b. mine basis. Freight charges included in the gross value of production of the gold mining and iron ore industries were therefore deducted.

### (b) Crude petroleum and natural gas

The value of production of natural gas was taken as the value at the well-head of gas produced by establishments principally engaged in the production, not the distribution, of natural gas.

### (c) Non-metal mining, quarrying, and prospecting

The Census of Industry figure is for gross value of shipments and an adjustment for the change in inventories of finished products should have been made but the figure was not available. Freight charges were included in the gross value of shipments and an adjustment was made for this. A deduction was made from the gross value of produc-



tion of the non-metal mining industry to exclude output also included in the sand and gravel industry.

An estimate of the net income originating in the prospecting industry was used as the gross value of production of the industry. The gross value of production of the quarrying and sand pit industries was reduced by an adjustment to eliminate the value of products quarried for own consumption by governments and railways since the inputs relating to these activities are not separated from those relating to activities classified in other industries.

## 5. Manufacturing

The D.B.S. Census of Industry is a census of **manufactured products**. The definition of gross value of production is therefore the sum of the value of products made by establishments classified to an industry in 1949. The Census schedule defined the value of products made in 1949 as follows:

"Products made: Give the quantities and selling values, at the works, of all products made during the year, whether sold or not, and whether made for sale in Canada or for export. Do not include sales tax or other excise duties. Do not include resale of goods which were not produced in this establishment."

For the inter-industry flow table it was necessary to define the gross value of production to include the change in goods in process, since on the input side all materials and services used during the year are included. For the value of output to be identical with the value of input, the change in goods in process must therefore be taken into account. Estimates of the change in goods in process of each industry were obtained from the worksheets of the National Income Section and added to the Census gross value of production figure.

Another difference from the Census of Industry figures is that in accordance with the Standard Industrial Classification, **repair establishments** were classified as manufacturing. The data on manufacturing are collected annually by the Census of Industry and the principal statistics for 1949 for each industry are published in the D.B.S., *General Review of Manufacturing Industries of Canada, 1949*. Data on repair establishments are collected decennially and data for 1951 are published in *Census of Canada, 1951*, Volume VII, "Distribution-Retail Trade." These figures were projected back to 1949 on the basis of indicators used for the *National Accounts*. (See pp. 106-107 of the *National Accounts*.)

Repair and similar type establishments covered by the decennial census and classified by the Standard Industrial Classification to manufacturing are included in the following industry groups:

Industry Group	Principal activity of establishment
Leather products	Shoe repair, harness repair
Clothing	Custom tailoring, dressmaking, and shirtmaking
Furniture	Upholstery and furniture repair
Iron and steel products, n.e.s.	blacksmiths, horseshoe shops, locksmiths, gunsmiths, and machine shops with gross value of production of less than five thousand dollars
Transportation equipment	bicycle and motorcycle repair, automobile service garages, battery ignition and electrical repair, body repair and paint shops, tire and brake shops, washing and polishing, and other automotive service
Jewellery and silverware	watch, clock and jewellery repair; jewellery engraving
Electrical apparatus and supplies	armature rewinding, radio and electrical repair
Miscellaneous manufacturing	taxidermists, sign painting shops, miscellaneous repair shops

With these two exceptions, the definition of manufacturing followed for the inter-industry flow study was the same as that used by the Census of Industry. It should be pointed out that although the value of products is defined "at the works", the boundary of the establishment is sometimes defined rather broadly. For example, bread manufacturers deliver their products directly to the household. In this case the value of bread produced is the delivered value to the household and the transportation activity of the manufacturing plant is included as part of manufacturing.

Where possible when an industry performed **contract or custom work**, only the amount received for performing this work, not the total value of the commodities, was included in the output of the establishment performing the custom work. The Census of Industry gross value of production figures for the grain mill product and wood products (exc. furniture) industries were adjusted to exclude the value of commodities on which custom work was done. Only the amount received for doing this work was included as output. An adjustment was also made to materials used figures in these industries. No adjustment was made, for example, to the meat products industries.

For a few industries the figure reported to the Census of Industry were **gross value of shipments**. An estimate of the change in inventories of finished products was added to obtain the gross value of production. This adjustment was made for the meat packing and slaughtering, pig iron, steel ingots and castings, rolled iron and steel products, Portland cement, lime, domestic clay products, and salt industries.

Other comments on or adjustments to the Census of Industry gross value of production figures are as follows:

### (a) Fish processing

An addition was made to the Census of Industry figure to include an estimate of the production

of inland fish processing establishments and the estimated production of Newfoundland fish processing establishments.

(b) Alcoholic beverages

For the distilled liquor and wine industries the goods in process inventory adjustment is implicit in the method used by the Census of Industry in calculating gross value of production. An adjustment was made in the distilled liquors industry for the difference between the value of the change in the inventory implicit in the Census of Industry figures and those obtained from the inventory worksheets of the National Income Section.

(c) Primary iron and steel

Because of the large volume of intra-company transfers between establishments within the primary iron and steel industry and between that industry and the wire and wire goods industry, only the sales of the pig iron, steel ingots and castings, and the rolled iron and steel products industries are included in the gross value of production by the Census of Industry. Such a large proportion of the total production of pig iron, for example, is transferred between establishments within the same company that it is difficult to establish a realistic value for it. For the inter-industry study, however, an estimate of the value of intra-company transfers to establishments in the wire and wire products industry was added to the gross value of production. This required that an adjustment be made to the cost of materials used in the latter industry. Revaluation of the value of production of some commodities resulted in a further increase in the gross value of production.

(d) Products of petroleum and coal

Establishments whose principal activity was manufacturing or distributing heating and illuminating gas are classified for the inter-industry study in the gas manufacture and distribution industry in the electricity, water, and gas utilities group. The gross value of production of the products of petroleum and coal industry was therefore reduced by the gross value of production of these establishments. The sales of gas by plants in the coke industry to their distributors in the gas manufacture and distribution industry was added to the gross value of production. An upward revision of \$50.9 million was made to the gross value of production of the petroleum refining and products industry to correct an error in valuing production which was revealed in the 1954 Census of Industry.

6. Construction

The construction sector of the table was defined to include all new and repair construction put in place in Canada in 1949, whether put in place by the construction industry or by the labour force of other industries. This is the same definition and estimate as appears in D.B.S., *Construction in Canada, 1951*.

7. Transportation, Storage, and Trade

(a) Transportation

The transportation industry includes all establishments primarily engaged in the provision of transportation services. Transportation services provided by the labour force of establishments classified in other industries are classified in those industries. Because of the closely integrated nature of railway, express, and telegraph services in Canada, these services are all classified in the transportation industry. Hotels and restaurants operated by railway companies, however, are classified in the personal service industry.

Estimates of total revenue for air transportation, interurban bus and coach lines, steam railways, urban and suburban passenger transportation, water transportation, and international bridge, tunnel and ferry companies were obtained from the publications of the Transportation Section of the Bureau's Public Finance and Transportation Division.

The D.B.S. publication *Motor Carriers: Freight and Passenger* contains some detail on trucking revenues. The coverage of this field is incomplete and adjustments were made on the basis of information on incorporated companies contained in *Taxa-Statistics, 1951*, and on employment in the industry as reported in the *Census of Canada, 1951*, Volume V. Revenues of oil pipelines were estimated on the basis of 1950 information. Estimates of revenues from taxicab operations were based on information made available by the National Income Section. Revenues of government companies classified in this industry, and not included in the above publications, were obtained from the *Public Accounts*. Estimates of revenues of stevedoring companies were based on employment as reported in the *Census of Canada, 1951*, Volume V.

(b) Storage

The estimate of revenue of grain elevators was made on the basis of revenue per bushel of grain handled by elevators. The D.B.S. report *Warehousing* gives revenues for other establishments classified in this industry.

(c) Trade

Since industries are shown in the table as if they sold their products directly to the user, the trade sector is not shown as purchasing goods intended for resale without further processing. The output of the sector is the sum of (i) the gross profit earned by selling goods (net sales less cost of goods sold), (ii) the total revenue from repair services performed by trade establishments, and (iii) the total revenue from meals served by retail trade establishments. The trade sector includes the gross profit margin on all goods sold for resale without further processing by all establishments, whether these are trade establishments or whether they are establishments classified to manufacturing or service industries. Because of statistical prob-



lems, however, some of the net profit margin on goods sold without further processing was left in the industries in which the establishments were classified. Only in the case of service industries was an adjustment made to the gross domestic product originating in the industry because of the inclusion of the gross profit margin on retail sales in the trade sector.

The estimate for retail trade was derived in the following manner: The Merchandising and Services Section of the Bureau conducts a survey every second year and publishes statistics on *Operating Results and Financial Structure* of "relatively pure" retail trade store types (stores which derive at least eighty per cent of their revenue from the sale of a particular group of commodities). These data suffer from the limitation, however, that the sample is not random and the representativeness of the sample has not, as yet, been satisfactorily determined. A weighted average retail gross profit margin for retail trade was derived by weighting the gross profit margins obtained from the operating results survey by 1951 retail sales figures obtained from the *Census of Canada, 1951*, Volume VII. This average was applied to the total retail sales, 1949 as published in D.B.S. Reference Paper 56 *Retail Trade, 1930-1951*. (Sales of establishments classified as eating and drinking places and tailoring and made-to-measure stores were excluded, however, and an estimate of retail merchandise sales by service and other establishments added.) An adjustment was made to make the estimate of gross domestic product originating in the industry consistent with the figures obtained from the *National Accounts*. The resulting gross profit was about twenty-one per cent of net sales. To this margin was added an estimate of the materials used in repair work done by retail stores and the cost of food used in preparing meals served at lunch counters in retail stores in order to arrive at the total output figure for retail trade.

For wholesale trade, the estimate of total gross profits is probably subject to a much larger error than for retail trade. The Bureau's survey of operating results covers only wholesalers proper; thus no data are available for agents and brokers, assemblers of primary products, and petroleum bulk tank stations, and manufacturers' sales branches and offices. A weighted average gross profit margin for wholesalers proper was derived by weighting the gross profit margins for various types of wholesalers proper by their 1951 sales. The result was an average of about fourteen per cent of net sales. This average was then applied to an estimate of 1949 sales of wholesalers proper projected from the 1951 Census figure. In the absence of gross profit data for other types of wholesalers, modifications were made to the data for wholesalers proper and applied to an estimate of 1949 sales by other types of wholesalers, which was estimated from data in the 1951 Census.

## 8. Communication

### (a) Radio broadcasting

This industry included both private establishments primarily engaged in the operation of radio services and the domestic service of the Canadian Broadcasting Corporation. Total revenue for privately owned radio broadcasting statistics was estimated from figures submitted to the Royal Commission on National Development in the Arts, Letters and Sciences and published in the *Canada Year Book, 1954*, pp. 894-895. These data include the number of stations, average profits, and profits as a per cent of sales, thus making possible an estimate of total income. The gross income of the Canadian Broadcasting Corporation was obtained from its annual report.

### (b) Telephone

Total revenue of establishments, whether owned by government bodies or private organizations, primarily engaged in the operation of telephone services is published in D.B.S., *Telephone Statistics*.

### (c) Other communication services

The revenue of establishments primarily engaged in the provision of cable services was obtained from D.B.S., *Telegraph and Cable Statistics*. A small amount was added to this to cover messenger service.

## 9. Electricity, Water, and Gas Utilities

### (a) Electric light and power

This industry includes all establishments, whether operated by private or public organizations, primarily engaged in the generation, transmission, and distribution of electricity together with all electricity produced for sale by establishments whose principal activity classifies them in other industries, for example, pulp and paper. The source of the total revenue estimate is the D.B.S. report *Central Electric Stations*.

### (b) Gas manufacture and distribution

This industry included establishments primarily engaged in the distribution of manufactured or natural gas for fuel and lighting purposes. Establishments classified here may manufacture their own gas. Coke produced as a secondary product by gas plants using by-product ovens is also included in the output of this industry. The production of natural gas is classified in the coal mining, crude petroleum and natural gas industry group. Data on the manufacture and distribution of manufactured gas are published in the D.B.S. report on the *Coke and Gas Industry* and on the distribution of natural gas in *Crude Petroleum and Natural Gas*.

### (c) Water distribution and related services

The principal item in this group is municipal waterworks. Sewage disposal and other sanitary services are operated as a part of municipal gen-

eral government establishments and are included in the government service industry. Information on waterworks was not available for all provinces so the revenue per household with running water was calculated for Ontario, for which data were available, and this figure was multiplied by the total number of households in Canada with running water, to arrive at total revenues. Estimates of the number of households with running water from a public source were obtained from the 1941 and 1951 *Census of Canada* (Volume IX, 1941; Volume III, 1951).

#### (d) Other public utilities

Estimates of the revenue of other public utilities (mainly steam heat) were obtained from Department of National Revenue, *Taxation Statistics, 1951*. These revenues accounted for less than one per cent of the total revenue of this group.

### 10. Finance, Insurance, and Real Estate

The general problem of defining the output of these industries is discussed on pp. 9-10.

#### (a) Banking

Data on the chartered banks are published in the *Bank of Canada Statistical Summary Financial Supplement, 1954*. Information from the National Income Section worksheets supplied the estimate of imputed charges. The annual report of the Bank of Canada furnished information on its operations.

#### (b) Investment and loan

Total revenue of incorporated personal and business credit companies; investment trust and holding companies; and stock, bond and commodity dealers was obtained from *Taxation Statistics, 1951*. To conform with the treatment in the National Accounts, an adjustment was made to remove the "transfer" portion of interest received from consumer loans. An adjustment should also have been made for interest received from business loans but because of statistical difficulties this was not done. Reports issued by the federal government and the Provinces of Ontario and Quebec cover the income of almost all trust and loan companies in Canada. The combined total income of unincorporated stock, bond and commodity dealers, real estate agents and insurance agents was available from *Taxation Statistics*. It was possible to estimate the portion of this going to insurance agents, but the allocation of the remainder between stock, bond and commodity dealers and real estate agents was arbitrary. Annual reports of government companies and boards provided data on their expenditure.

#### (c) Life insurance

Data on life insurance companies are contained in Volume II of the annual reports of the Department of Insurance. To this was added an estimate for mutual companies. An adjustment was also made to subtract the portion of expenses of Canadian companies applicable to foreign operations.

#### (d) Non-life insurance

The item "depreciation allowances and similar business costs" includes the claim portion of insurance against fire and other damage to business property (including all residential property) and the claim portion of business insurance against financial loss (fidelity insurance). The output of non-life insurance companies was therefore defined as total premiums paid less claims paid. Data on these companies are contained in Volume I of the annual reports of the Department of Insurance. Whereas life insurance agents are considered part of the life insurance companies, agents for non-life insurance are part of separate companies. Commissions paid to non-life insurance salesmen are therefore considered as the gross income of independent companies and are shown as a payment of non-life insurance companies to insurance agents.

#### (e) Real estate

The output of the real estate industry was defined to equal the sum of: (i) paid and imputed residential farm and non-farm rents, (ii) paid farm and non-farm non-residential rents, (iii) gross income of real estate agents, and (iv) expenditure of government companies classified to this industry (including Central Mortgage and Housing Corporation).

The estimates of gross rents were taken directly from the National Income Sections' worksheets. Residential non-farm rents were estimated by multiplying an estimated average rent figure by the number of rented dwellings in Canada. Farm rents are published in D.B.S. Reference Paper No. 25, *Handbook of Agricultural Statistics*, Part II, p. 56. Data on rents paid by corporations were obtained from *Taxation Statistics*. Rents paid by unincorporated trade establishments were estimated on the basis of data obtained in the operating results survey; while rents paid by other unincorporated business were estimated on a rough basis. Rents paid by the federal Government were obtained from the *Public Accounts*. Although these estimates of gross non-residential rents do not appear in the *National Accounts* they were estimated by the National Income Section as part of the procedure in arriving at an estimate of non-residential rents received by persons.

Income of incorporated real estate agents was obtained from *Taxation Statistics*. As explained previously, total income of unincorporated finance companies is in *Taxation Statistics* but the portion to be allocated to real estate dealers was arbitrary.

### 11. Service Industries

Since the trade sector is defined to include the gross profit margin on all goods sold without processing by selling establishment, retail sales of merchandise (except alcoholic beverages and meals) were excluded from the output of service industries.

#### (a) Community or public service

This industry includes all establishments engaged in the provision of education, health, or wel-



fare services. These establishments may be either privately or publicly owned; thus, all municipal schools and federal and provincial hospitals and schools are included in this industry. Data on municipal schools are published in the *Canada Year Book*, 1952 page 53. The worksheets of the Bureau's Education Division provided information on other educational institutions. The publications of the Bureau's Health and Welfare Division provided data on mental institutions, hospitals, and tuberculosis institutions. The gross income from independent professional practice of medicine, dentistry, and nursing is partly obtained from *Taxation Statistics* and partly from surveys conducted by the National Income Section of doctors, dentists, and nurses (see *National Accounts*, p. 97). An estimate for religious and welfare institutions was estimated on the basis of data published in D.B.S. *Census of Welfare Institutions*, 1946.

#### (b) Government service

The government service is defined, as closely as the available data for 1949 permitted, according to the Standard Industrial Classification. Thus it includes government departments, including all the Department of National Defence operations, but excludes the Post Office, government business enterprises, and agencies engaged in communication, health and education services. The coverage of the government service industry can therefore be described as "public administration and defence." The total output for this component of the service industry group was obtained in the following manner:

Government expenditure on goods and services (See p. for a definition of this concept. The estimate is taken from Table 2 of the <i>National Accounts</i> ) .....	\$2,128.0 million
Less: Government capital expenditure .....	- 556.2
Less: Current expenditure of government establishments classified in other industries (Dominion Government Telegraphs in transportation, Canadian Broadcasting Corporation in communication, Crown Assets Disposal Corporation in trade, federal and provincial hospitals and municipal schools in community service) ....	- 292.5
Total output of government service industry .....	\$1,279.3 million

#### (c) Recreational service

The *Census of Canada, 1951*, Volume VIII, "Distribution-Wholesale Trade and Services," Table 21, contains gross revenue figures for establishments classified in amusement and recreation. From the Census group, rental libraries were transferred to community service. Theatrical services and coin-operated machine rental and repair, which are classified by the Census of Distribution in business services, were transferred to the recreation group. The 1951 figures were adjusted to the 1949 level by straight-line interpolation with the 1941 Census figures. An addition was made to

include paramutual betting, itinerant picture exhibitors, and undercoverage of orchestras. Some associations of individuals, such as golf clubs, riding stables, and so forth, were excluded because of lack of data and their expenditure treated as direct personal expenditure.

#### (d) Business service

The *Census of Canada, 1951*, Volume VIII, Table 21, provides gross revenue figures for establishments classified in business service. From this group sign painting shops were transferred to miscellaneous manufacturing, dental laboratories to community service, dwelling and building services to personal service, theatrical services and coin-operated machine rental and repair to recreation service. Estimates of accounting, engineering and scientific, and legal services were made on the basis of surveys conducted by the National Income Section and from data in *Taxation Statistics*. (See *National Accounts*, p. 97.) The business service industry was defined as selling all advertising purchased by industry; thus, the industry is shown as buying the following advertising output of the printing and publishing, miscellaneous manufacturing, and communication industries and selling it to the actual purchaser:

Printing, publishing, and allied industries	\$158.9 million
Revenue from advertising .....	117.9
Advertising materials .....	41.0
Miscellaneous manufacturing industry .....	8.2
Communication industry .....	18.6
	\$185.7 million

#### (e) Personal service

The *Census of Canada, 1951*, Volume VIII, publishes gross receipts for establishments classified in personal service. From this group shoe repair shops were transferred to the leather products industry, and travel bureaus and ticket agencies to the transportation industry. Transferred to personal service were the undertaking and funeral service group, photography group, and hotel and tourist group. From retail trade were transferred eating and drinking places. Board and lodgings are also included in this industry; the estimate for universities was obtained from the Education Division while that for rooming houses was based on the 1947-48 survey of family expenditure and projected on the basis of restaurant sales. An imputed amount for board and lodgings provided free of charge to workers was estimated by the Labour and Prices Division. An estimate for domestic services was projected on the basis of the *Census of Canada, 1941*.

#### 12. Imports of Goods and Services

The total for imports shown in the inter-industry flow table \$3,447 million, differs from the figure in the *National Accounts*, \$3,837 million, by the amounts of interest and dividends paid abroad, \$390 million. This is because the inter-industry table

measures production in Canada rather than production by Canadian residents. The *National Accounts* total, in turn, differs from that in the D.B.S., *The Canadian Balance of International Payments in the Post-War Years, 1946-1952*, \$3,912 million, by the amount of migrants capital and inheritances, \$53 million, which are treated as capital transactions in the *National Accounts* (see Table 42 of the *National Accounts*) and by a statistical discrepancy of \$22 million resulting from revisions in the *Balance of International Payments* figures not yet incorporated into the *National Accounts*.

For the inter-industry flow study the total of merchandise imports was defined c.i.f. Canadian border and is the aggregate of the following *Balance of International Payments* and *Review of Foreign Trade* figures:

Merchandise imports (adjusted) .....	\$2,696 million
Freight and shipping on imported merchandise .....	240
	\$2,936 million

To the extent that part of the \$240 million was actually paid to Canadian carriers and did not, therefore, represent imports, an offset was made in the unallocated column so that the total imports would be correct.

A statement of p. 71 of the *Balance of International Payments* reconciles the \$2,696 million total of that publication with the total of \$2,761 million published in *Trade of Canada, 1949*. Data on the individual commodities imported are published in *Trade of Canada, 1949*, Volume III. In the commodity detail used for the inter-industry study, commodities imported by Newfoundland during the first quarter of 1949 were included and imports into Newfoundland from Canada during the same period were excluded. An adjustment was made in the unallocated column of the table to make the total add to the control total stated above. This adjustment for Newfoundland was made since production figures generally included Newfoundland for all of 1949.

The import figures in *Trade of Canada* are valued f.o.b. point of shipment. For the inter-industry flow table these figures were raised by \$240 million to bring them to c.i.f. Canadian border values.

## B. INTERMEDIATE INPUT AND OUTPUT

Since the cells of quadrangle I of the inter-industry table represent both the input into an industry and the output of another industry, the cells can be filled in either by estimating the inputs into each industry or by estimating the disposition of output of each industry. The method chosen was to estimate the inputs into each industry. When this was done it was found that there was still some unallocated input and output. Some of the output of some industries (including imports) was then assigned to the using industry on the basis of the nature of the commodity—some commodities are obviously designed for use in particular industries.

In general, the method of allocating inputs into an industry according to the industry of origin was to first determine the value of the various commodities and services used as inputs into an industry and then to determine the industry of origin. This involved assembling total "domestic supply" figures for groups of commodities—domestic production less exports for each industry group which produced the commodity, plus imports.

Merchandise import data as published in *Trade of Canada*, Volume III, show the value of merchandise imports f.o.b. point of shipment (i.e., excluding charges such as freight, insurance, handling, duties or taxes). To compare the value of imports with those of similar commodities produced by a domestic industry, it was necessary to value them at a common point—the delivered price to the user. To the f.o.b. point of shipment value was added, therefore, an estimate of custom duties and distribution costs involved in moving the goods to the using site.

In the cases where more than one industry used the commodity and that commodity was produced by more than one industry or by a domestic industry and also imported, a decision had to be made as to the source of supply. In most cases, however, the industry groupings were so broad that all of a commodity was produced within the same group. The majority of difficult cases were associated with the metal-using industries. It was sometimes found that the average unit value of the material provided a clue to its industry of origin. Where no other clue existed, the total "supply" was prorated among the various users in accordance with the amount produced by each supplier.

Since output is defined at purchasers' prices, the costs of distributing the output of an industry from producer to user are included as input into the producing industry in order that the value of total input be identical with the value of total output. These distribution costs include transportation costs, warehousing and storage charges, wholesale and retail trade margins, and so forth. The method of making these estimates for output destined for final output sectors is explained in Section C. For inter-industry transactions, in those cases where both physical quantity and value data were available for both use and production of a commodity, the average unit value at the producing plant and the average unit cost to the user were compared. The difference between these two averages measures the unit "spread" between purchasers' and producers' prices. For most inter-industry transactions no taxes were included in this spread. Where taxes were levied, however, the tax portion was then estimated and subtracted from the spread. The total distribution cost was then obtained by multiplying the spread (excluding taxes) by the number of units used. Where physical quantity data were not available, the spread was assumed to be the same as for similar transactions for which physical quantity data were available.



This spread was then entered in the transportation, storage, and trade row of the table in the column for the industry producing the commodity. Because of the difficulty in determining the transportation, storage, and trade components of spread separately for all transactions, these three industries were grouped together in the inter-industry flow table.

The spread between the value of imports f.o.b. point of shipment and the cost to the user was estimated in a similar manner. In this case, however, customs import duties were frequently included in the spread and these were then estimated and subtracted from the spread. The total spread (excluding taxes and duties) on imports was then totalled for each industry using imported goods. An estimate was then made of the portion of the spread which applied to the difference between the value of imports f.o.b. point of shipment and the value c.i.f. the Canadian border. This portion of the spread was included in the import row of the table in the column for the industry using the imported goods. The residual amount of spread (the portion relating to distribution from the border to the using site) was included in the transportation, storage, and trade row for the industry using the goods.

The only intermediate input, except merchandise imports, for which there was a common source for all industries was **repair expenditure**. Data on these expenditures are collected by the Forecast Surveys Unit of the General Assignments Division of D.B.S. and published in Department of Trade and Commerce, *Private and Public Investment in Canada: Outlook, 1951*, and in Department of Trade and Commerce, *Private and Public Investment in Canada, 1926-1951*. Since all new and repair construction was assumed to have been put in place by the construction industry, all repair construction expenditure was defined to be an input from the construction industry. One adjustment was made, however, to the published industrial distribution. The data collected by the Forecast Surveys Unit are on plant and equipment used by an industry. This may include rented buildings. For the inter-industry study, however, all rental activity was assumed to have been carried on by the real estate industry. An estimated amount of repair expenditure on rented buildings was therefore transferred from the industry where the building was used to the real estate industry.

The treatment of repair expenditure on machinery and equipment was more difficult. In the first place, if the establishment made its own repairs, this figure included wages paid to the labour force of the establishment which were already included in the estimate of wages and salaries paid to workers in the industry. A rough adjustment was made to eliminate this double counting. Secondly, for some manufacturing industries repair expenditure was included in materials used; an adjustment was also made to remove this double counting. The residual amount of expenditure could represent payments to several industries — rubber products, furniture, agricultural implements, other iron and steel products,

transportation equipment, electrical apparatus and supplies, and so forth — or payments for imported parts. The allocation was quite arbitrary although knowledge of the nature of machinery and equipment used in a particular industry provided a guide.

## 1. Agriculture

Data on farm operating expenses are published in D.B.S. Reference Paper 25, *Handbook of Agricultural Statistics*, Part II, pp. 56-57. Adjustments were made to these figures to make them consistent with the adjustments to gross income made for the inter-industry study. Where necessary a further breakdown of some expenditure items was made, in some cases, on the basis of production figures for the materials, in other cases on estimates made on the basis of related indicators.

## 2. Forestry

The D.B.S. circularizes each year a sample of the more important concerns carrying on logging operations regularly in Canada. The firms so covered in 1949 produced about one-third of that year's total cut. From this survey data were obtained on expenditure on supplies. These estimates were inflated to an estimate of total expenditure for the industry. Since the sample covered only the larger operators, the assumption that smaller firms' expenditure on supplies was in the same proportion as for larger firms may not be justified. The large unallocated input in this industry is an indicator that some error, as yet undetermined, was made.

## 3. Fishing, Hunting and Trapping

### (a) Fishing

Data on expenditure by enterprises in the primary fishing industry were published in *Census of Canada, 1951*, Volume IX, "Fisheries", Table 16. These data were adjusted to the 1949 level by using the ratio of total landed value of fishery products in 1949 to 1951.

### (b) Hunting and trapping

No data are available on intermediate input into this industry. The total amount was therefore left in the unallocated row.

## 4. Mining, Quarrying, and Oil Wells

Data on expenses by these industries are published in D.B.S. Reference Paper No. 29, *Purchases of Capital Goods, Process Supplies and Specified Services by Canada's Mineral Industries, 1949*. For the inter-industry flow table, current expenditure was distinguished from capital expenditure. An adjustment was also made for some industries included in the inter-industry study as manufacturing or public utilities rather than mining. Data on payments to contract diamond drillers were obtained from D.B.S. report, *Contract Diamond Drilling in the Mining Industry*.

The inputs into the non-ferrous metal smelting and refining industry were estimated in the same manner as those for manufacturing industries.

## 5. Manufacturing

### (a) Materials, fuel and electricity used

Data on materials, fuel and electricity used are collected on the D.B.S. Census of Industry. Commodity detail on materials are collected every year and in 1949 the instructions on the schedule read as follows:

"Materials and Supplies Used - Give the quantity and the laid-down value at the factory of the materials and process supplies used in making products reported (below). Process supplies should only include the expenditures made in keeping your machinery going, such as small parts, lubricating

oil, etc. Do not include here overhead expenses, such as major repairs, office supplies, cost of fuel and electricity or any other expenditure not usually charged to 'materials account'. Report materials USED, not materials PURCHASED. Do not include materials purchased for resale without further manufacture."

Detail on fuels used is collected about every five years, although the total use of fuel and electricity is collected every year. Detail on fuel used was collected in 1948 and adjusted to the 1949 level. The 1948 questionnaire was as follows:

"Fuel and electricity used during the year:

(State cost in each case as laid down at the works, including freight, duty, etc. Do not consider fuel purchased as representing fuel used unless the quantities are the same.)

Kind	Quantity	Cost at plant (Omit cents)
1. Bituminous coal (a) From Canadian mines .....	..... tons	\$ .....
2. (b) Imported .....	..... tons	\$ .....
3. Sub-bituminous coal (from Alberta mines only) .....	..... tons	\$ .....
4. Anthracite coal .....	..... tons	\$ .....
5. Lignite coal .....	..... tons	\$ .....
6. Coke (for fuel only) .....	..... tons	\$ .....
7. Gasoline (include gasoline used in cars and trucks).....	..... imp. gals.	\$ .....
8. Kerosene or coal oil .....	..... imp. gals.	\$ .....
9. Fuel oil (do not include lubricating oil) .....	..... imp. gals.	\$ .....
10. Wood (cords of 128 cubic feet of piled wood) .....	..... cords	\$ .....
11. Gas (a) Manufactured .....	..... 1,000 cu. ft.	\$ .....
12. (b) Natural .....	..... 1,000 cu. ft.	\$ .....
13. Other fuel (state kind and quantity) .....	.....	\$ .....
14. Electricity purchased (include service charge in cost)		
(a) For lighting and motors .....	..... k.w.h.	\$ .....
15. (b) For other purposes .....	..... k.w.h.	\$ .....
16. Total .....		\$ .....
17. Electricity generated for own use.....		..... k.w.h.
18. Electricity generated for sale .....	..... k.w.h.	\$ .....

To the Census of Industry figures for manufacturing were added rough estimates of cost of commodities used or sold and the cost of fuel and electricity for repair establishments classified to manufacturing (see section A).

The use of containers and packaging materials posed a difficult problem in many industries since the types of containers and materials were not itemized. For these industries a rough estimate of

the value of the various containers used was made. The residual amount of containers produced which were not assumed to have been consumed by manufacturers, except for a small allowance for household use, were assumed to have been used by the trade industries.

The adjustment for custom work discussed in section A was made to the grain mill products and wood products (exc. furniture) industries.



Other significant adjustments made to Census of Industry figures were as follows:

**(i) Fish processing**

An addition was made to the Census of Industry figure to include an estimate of the cost of materials used in inland fish processing establishments and in Newfoundland fish processing establishments and an adjustment made to the cost of fuel and electricity.

**(ii) Primary iron and steel**

The cost of materials used was increased by the value of scrap iron and steel transferred from an establishment in another industry to an establishment of the same company in the primary iron and steel industry.

**(iii) Iron and steel products, n.e.s.**

The cost of materials used was increased to include intra-firm shipments from the primary iron and steel industry to the wire and wire goods industry.

**(iv) Products of petroleum and coal**

Establishments whose principal activity was manufacturing or distributing heating and illuminating gas are classified for the inter-industry study to the gas manufacture and distribution industry. The cost of materials used and the cost of fuel and electricity used by the products of petroleum and coal industry were therefore reduced by the amount of this transfer.

**(v) Chemicals and allied products**

The cost of materials used in the chemicals and allied products industry was reduced by the cost of containers used in the compressed gas industry since the cost of these containers was classified as a capital expenditure for this study.

The Census of Industry in 1949 did not collect data on specific materials used for some industries in the clothing and in the transportation equipment industry groups. The gap in data for the clothing industry was filled by allocating unallocated amounts of materials produced in the textile, clothing, and miscellaneous manufacturing industries of a kind used in making clothing. A rough estimate of the spread between producers' and purchasers' prices was also made. For the aircraft and motor vehicles industries the estimates were based on the United States Department of Labor, Bureau of Labor Statistics, "Table of the Interindustry Flow of Goods and Services by Industry of Origin and Destination, Continental United States, 1947" (Division of Interindustry Economics, October, 1952). Since these data were at producers' prices, they also had to be converted to purchasers' prices.

**(b) Other intermediate input**

The sources and methods for repair expenditure are explained on p. 37. If the total cost of mate-

rials, fuel, and electricity used; repair expenditure; wages, salaries and supplementary labour income; corporation profits before taxes, other income, and depreciation allowances and similar business costs is subtracted from the gross value of production (f.o.b. plant, excluding excise taxes and excise duties) a residual amount of miscellaneous intermediate inputs plus property and other miscellaneous taxes is obtained. This residual includes expenditure on advertising, telephone, telegraph, insurance, rent, office supplies, professional fees, and so forth. Almost no recent data are available on these expenditures. For advertising, Table 8 of D.B.S. Reference Paper No. 67 *Advertising Expenditures in Canada, 1954* contains the ratio of total advertising costs (including internal costs) to sales of large firms in each industry for 1954. Other data available are from a survey of manufacturing firms for the year 1936 conducted by the Dominion Bureau of Statistics for the Rowell-Sirois Commission. (The results of this survey were published by Donald C. MacGregor, "Manufacturing Expenses, Net Production, and Rigid Costs in Canada," *Review of Economics and Statistics*, XXVIII (May, 1945), 65.) This survey collected data on operating expenses as a per cent of net sales, collecting the following items which have been rearranged to a form relevant to this gap in inter-industry data:

1. Net Sales
2. Less: Goods bought for resale
3.       Payments to public carriers
4.       Federal sales taxes
5. Net Total (1-2-3-4)
- Miscellaneous expenses:
6. Professional and other fees
7. Operating expenses (except payroll) of own transport services
8. Stationary, office supplies, printing
9. Travelling expenses
10. Advertising
11. Telephone, telegraph, cable
12. Miscellaneous administrative
13. Rent
14. Insurance
15. Patents, royalties, etc.
16. Municipal taxes on property
17. Miscellaneous
18. Total (6+ ... +17)

The ratio of total (5) to total (18) approximates as closely as the data permit to the ratio of "other intermediate input" (including property and other miscellaneous taxes) to gross value of shipments of products of own manufacture, f.o.b. plant excluding excise and sales taxes (gross value of production less inventory change of goods in process and finished goods). The total amount of these expenses arrived at by the residual method was \$1,017 (or 9.3 per cent of the gross value of shipments); using 1936 percentages applied to 1949 gross value of shipments \$943 was obtained (8.9 per cent of the gross value of shipments). Although the two aggregates are fairly close, this does not mean that the individual components have not changed very much over time. Some of them, moreover, bear little relation to sales — for example, property taxes. For want of other information these ratios were used for a preliminary estimate of these inputs into manu-

facturing. The total for each expense was then added for all industries and compared with the total output which had to be allocated. The industrial distribution of the expense item was then adjusted to add to the predetermined total by adjusting the estimate for industries where the estimate was not based on reliable recent information. Since this procedure was followed, the total output of most non-commodity producing industries was allocated to a using industry. The fact that zero is shown in the unallocated column does not, therefore, mean that the distribution of output is of a higher degree of accuracy than those with large unallocated outputs.

## 6. Construction

The estimate of the value of materials used in 1949 was made by applying a weighted percentage of the cost of materials used to value of construction put in place in 1951, 1952 and 1953 to the total value of construction put in place in 1949. These data were obtained from D.B.S., *Construction in Canada, 1953-1955*.

In order to estimate the commodity content by industry of origin of the materials used in construction, commodity flow studies were made. From data collected by the 1949 Census of Industry, the gross value of production (f.o.b. plant, excluding excise taxes) for all construction materials was obtained. From the total value of production for each material was subtracted an estimate of the amount used in other industries, exports, and a rough adjustment made in some cases for change in inventories. The residual figure so obtained was assumed to be the amount that was used in construction. In order to raise the value of these materials to the actual cost to the user, estimates of excise taxes, transportation and storage costs, and trade margins were added.

A similar procedure was followed with imports. Total imports of construction materials were obtained from *Trade of Canada, 1949* and deductions were made for use of these materials in other industries. Customs duties, as reported in *Trade of Canada*, were added and estimates of the amount of excise taxes, transportation and storage costs, and trade margins added.

An overall adjustment was then made in order to make the components add to the estimated total cost of materials used in 1949.

Since the estimates were made residually, any error in the estimates of other use of these materials would of course affect these estimates. Moreover, errors in allocating taxes, transportation, storage cost, or trade margins should also be taken into account. The lack of reliable information on the use of some of these materials by consumers for non-construction purposes introduces another source of error into the estimates.

## 7. Transportation, Storage, and Trade

### (a) Transportation

The expenses for some industries (steam railways, urban and suburban transportation) are classified according to the object or purpose for which the expenditure is made (e.g. maintenance of equipment). It was necessary to translate this classification into a goods and service classification (expenditure on locomotive parts) and then into an industry-of-origin classification (transportation equipment industry). This translation of classifications (which also applied to some other industry groups, such as trade, the post office, and government service) involves considerable guesswork even though it is possible to ascertain the items making up the totals. Information was not available, however, on the amounts for each component of an object classification.

In most cases data on expenditure were obtained from the publications of the Transportation Section of the D.B.S. Public Finance and Transportation Division. For air transportation, a more detailed breakdown of expenses for Trans Canada Airlines, which received sixty-five per cent of the total revenue of air transportation companies, was obtained from its annual report and used to supplement the information of air transportation companies published in D.B.S. *Civil Aviation*. Similarly the annual report of the Canadian Steamship Lines provided additional detail for the water transportation industry. Expenses of government companies were obtained from the *Public Accounts*, where the classification was on an object of expenditure basis.

### (b) Storage

Expenses were obtained from D.B.S. report *Warehousing*, and an amount added to cover grain elevators.

### (c) Trade

A percentage breakdown of profit and loss data of selected retail trade stores is contained in D.B.S. *Operating Results and Financial Structure*. The items collected are as follows:

Gross profit

Operating expenses:

Employees' salaries and wages

Taxes

Insurance

Rent

Heat, light and power

Delivery

Repairs and maintenance

Depreciation allowances

Store supplies

Advertising

Bad debts written off

(Less) amount recovered

Net bad debt loss

All other expenses

Total operating expenses

Net trading profit before deduction of proprietors' salaries and income tax



Each item of the expenses for each store type was weighted by the 1951 sales figures obtained from the *Census of Canada, 1951*, Volume VII; the weighted average so derived was applied to the 1949 sales figure. It was necessary, in some cases, to arbitrarily translate an object of expenditure classification (e.g. heat) into a goods and services classification (coal, fuel oil, gas) and then into an industry-of-origin classification (coal mining, imports, and so forth). A rough estimate was made of the materials used in repair work and the food used in preparing meals sold in retail trade establishments.

For wholesalers proper a similar method was followed. Using the figures for wholesalers proper as a basis, the percentage of net sales spent by other types of wholesalers on various operating expenses was estimated. These percentages were then applied to the 1949 total sales figures (see p. 33).

## 8. Communication

Very few data were available on expenses and rather arbitrary estimates were made. The expenses for the whole telephone industry were estimated on the basis of information on the Bell Telephone Company of Canada published in its annual report. Expenses of cable companies were allocated on an arbitrary basis.

## 9. Electricity, Water, and Gas Utilities

### (a) Electric light and power

Details on expenses of Ontario and Quebec Hydro-Electric Power Corporations were obtained from their annual reports. These were used to allocate the expenses of all central electric stations.

### (b) Gas manufacture and distribution

Since these industries are covered by the Census of Industry, the estimation procedure was the same as for mining and manufacturing industries.

### (c) Water distribution and related services

Details of expenses for the cities of Ottawa, Winnipeg, Saint John and Vancouver were obtained from the municipal reports. Most use was made of the city of Ottawa report, which had the most detailed information, and this was used to allocate expenses of all waterworks. Expenditure on chemicals was estimated on the basis of data published in *Consumption of Chemicals in Municipal Waterworks, 1949* (a report prepared by the D.B.S. Metals and Chemicals Section).

### (d) Other public utilities

Rough estimates were made for the rest of the public utility group.

## 10. Finance, Insurance and Real Estate

### (a) Banking

Data for broad categories of expenses for the chartered banks were obtained from the *Bank of*

*Canada Statistical Summary, Financial Supplement, 1954*, p. 34. The expenses of the Bank of Canada are available from the *Proceedings of the Standing Committee of the House of Commons on Banking and Commerce, First Session of the Twenty-Second Parliament of Canada, 1954*, p. 734.

### (b) Investment and loan

The reports issued by the Ontario, Quebec, and federal governments contain information on the expenses of trust and loan companies. The annual report of the Department of Insurance provides details of operations of companies engaged in personal credit. The expenses of business credit companies was allocated according to the distribution of personal credit companies. Although detailed expenses (on an object of expenditure basis) were available for trust and loan companies and personal credit companies, very little information was available for other parts of this group.

### (c) Life insurance

Expenses of life insurance companies are published in Volume II of the Department of Insurance annual reports. Ratios devised by the National Income Section were used to subtract out the portion of expenses of insurance companies applicable to foreign operations and to add in the expenses of mutual companies.

### (d) Non-life insurance

Expenses of non-life insurance companies are contained in Volume I of the annual reports of the Department of Insurance. An addition was made for the expenses of fraternal and foreign companies for which detailed figures are not available. A rough estimate of the industry from which the goods and services used by insurance agents were obtained was made.

### (e) Real estate

The estimates of expenses connected with residential buildings and farm non-residential rental buildings were taken from the worksheets of the National Income Section. Estimates were made for non-farm non-residential buildings. Expenses of real estate agents were allocated on a very rough basis. The annual reports of Central Mortgage and Housing Corporation provided information on its operations.

## 11. Service Industries

### (a) Community or public service

Expenditure data for hospitals are published in D.B.S. *Annual Report of Hospitals*; data for schools and universities in financial statements, in board of education reports, and in the reports of universities. A sample of the financial statements of eleven welfare institutions was used as a basis for allocating the expenses of all welfare institutions. The sample was not necessarily representative but was the only detailed information available. Some information on independent practice of medicine, dentistry, and nursing was obtained from surveys conducted by the

National Income Section (see *National Accounts*, p. 97). A rough estimate was made for the expenses of other community service establishments.

#### (b) Government service

For the federal government the basis of the figures for intermediate input was a breakdown of the "Estimates" for 1949-50, prepared by the Treasury Board for the Senate Finance Committee, according to the recently adopted "Summary of Standard Objects of Expenditure and Special Categories." The percentage distribution derived from this table was applied, after certain adjustments were made, to the *National Accounts* figure of federal government expenditure on goods and services. From the "Standard Objects" the following adjustments were made in order to arrive at expenditure on new goods and services:

- (i) Land and used capital assets were excluded.
- (ii) All purely transfer and subsidy items, except payments abroad (which are treated as goods and services in government in order to offset the negative in the import figure, no production being involved), were excluded.
- (iii) The government special contributions to pension funds (re actuarial deficits and arrears) were eliminated. Only current contributions are included in goods and services.
- (iv) Post office expenditure not eliminated in the Treasury Board statement was deducted from the appropriate categories using the *Public Accounts* as a guide. (The post office was classified in the communications industry.)

The third stage was to eliminate the category "Estimated Savings and Recoverable Items" from the appropriate object categories. The amount refers to commitment authority provided for in the estimates, but against which cash will not be required in the fiscal year 1949-50. Commitment authority of this nature is only required where contracts have to be entered into which cannot be fulfilled within the fiscal year. Thus, materials and supplies, acquisition and construction of buildings, acquisition and construction of equipment, would be primarily affected. It was assumed that the entire adjustment applied to these three categories, and the amount was allocated on a pro rata basis.

These adjustments yielded a figure of \$955.8 million broken down by object of expenditure representing estimated cash requirements for 1949-50. This figure compares with actual realized expenditure for 1949-50 of \$858.3 million. On the face of it, this would seem to be a large discrepancy between the estimated cash requirements and actual cash outlays. The *Public Accounts* indicate, however, that an amount of \$167 million lapsed in that particular year; that is, this amount was estimated for and appropriated but was not actually spent.

The percentage distribution of the figure of \$955.8 million by object of expenditure was applied to the matching calendar year total in the *National Accounts*. Certain other adjustments required to

bring this matching total to the final *National Accounts* figure of \$880 million were also made.

Once the estimates for calendar year 1949 had been made according to the "Standard Objects of Expenditure Classification," the task still remained to translate them into an industry-of-origin classification. This was done by coding the list of suppliers receiving \$10,000 or over published in the *Public Accounts, for the year ending March 31, 1950* according to the Standard Industrial Classification code for the establishment. The totals for S.I.C. codes were then aggregated into the industry groups used for the inter-industry flow study. Establishments which the S.I.C. codes as wholesale or retail trade were re-coded according to the industry producing the principal commodity sold by the establishment. In some cases the establishment's sales were not allocated because of the difficulty of determining the industry of origin of the goods sold.

The allocation of provincial and municipal government expenditure was a very difficult task since no "standard object" classification was used for reporting their expenditures. Use was made of readily-available information from the various public accounts but in the main the expenditures of these governments were allocated according to the pattern of non-defence spending by the federal government.

#### (c) Recreational service

Details on operating expenses of the National Film Board were available from its annual report. No detailed information was available on the expenses of other establishments in this industry.

#### (d) Business service

The inclusion of all advertising revenue in the output of this industry resulted in the inputs listed on p.35 being included as intermediate input into the industry. Very little information was available on the expenditure of establishments classified to this industry and so the estimates of other intermediate input are quite arbitrary.

#### (e) Personal service

Eating and drinking places are classified in this industry. Estimates of food input into these establishments were not available but were estimated in total and the breakdown by commodities made according to proportions of expenditures on food by urban families as published in D.B.S. Reference Paper No. 60 *Urban Family Food Expenditure, 1953*. This commodity classification was then translated into an industry-of-origin classification.

The amount of required detail on commodity expenditures for estimation of intermediate inputs is seldom provided in sufficient degree for the needs of inter-industry studies. In the case of the D.B.S. publication on *Laundries, Drycleaners, and Dyers*, for example, the salaries and wages, cost of materials and supplies used, fuel and electricity, were given in broad individual groupings with "all



other operating expenses" lumped together. The search for greater detail unearthed a number of financial statements with varying amounts of details on specific expenditures for commodities such as paper, etc., or for services such as rent, legal fees, etc. Since the financial statements could not be reliably used as a sample of the industry, an attempt was made to find some consistency between them for specific expenditures to serve as guide to estimating intermediate inputs. Even though these estimates were not entirely arbitrary, the basis for them cannot be defended as being very reliable. Estimates for other industries in the group were made in a similar manner or were based on very rough estimates.

## 12. Unallocated Intermediate Input and Output.

### (a) Input

For manufacturing industries the unallocated input represents mainly materials used which were not specified in sufficient detail when reported to the Census of Industry to enable their assignment to the industry of origin. The remainder represents an allowance for various overhead costs which were not allocated in detail. As was explained above, total input for manufacturing industries was not estimated independently of total output so that the unallocated input item does not contain a residual error estimate component. For other industries the unallocated input item represents the difference between the sum of the various inputs which were charged specifically to the industry and the estimate of total output for that industry.

### (b) Output

One problem which affected the estimates of the disposition of output of the various industries was the time period for which the various statistics were collected. All data should have referred to production and use during the calendar year 1949. In fact, however, establishments reporting to the Bureau's Census of Industry may report for their own financial year rather than for the calendar year. As a result discrepancies may occur between material used and production figures.

In some cases the figure reported in 1949 to the Census of Industry for gross value of production may have been gross value of shipments. Except for the cases listed in Section A, it was assumed, because of the lack of definite information, that the figure was production and no adjustment of change in inventory of finished goods was made. (In 1952 the Census of Industry began collecting data on shipments instead of production.) The figures reported for cost of materials and fuel used may, in some cases, have been that for materials and fuel purchased. Again because of the lack of certainty as to which figure was reported, no adjustment for change in raw material inventory was made. In the case of transfers between establishments within the same company, the reporting of arbitrary values may lead to some inconsistencies.

The content of the unallocated output for the various industries is as follows:

#### (i) Agriculture

About one-quarter of the unallocated output of agriculture is wheat and approximately three-quarters is live stock.

#### (ii) Mining and Manufacturing Industries

Most of the unallocated output in these industries represents products reported to the Census of Industry in insufficient detail to enable them to be allocated to the using industry. Frequently a group of products is simply described as "other products".

#### (iii) Transportation, Storage and Trade

The unallocated output of this industry group represents the discrepancy between the estimate of total output of the industry group and the total of the estimates of the distribution costs incurred in moving goods from the various producing industries to the user. In the event that it can be determined that the output estimates for the transportation, storage, and trade industries are too high, the various inputs into the industry group must be reduced accordingly. If the output estimates are correct, the total output at producers' prices of various other industries must be increased to absorb these unallocated distribution costs. Insufficient evidence is available at the present time to determine which combination of these alternatives is correct.

#### (iv) Finance, Insurance and Real Estate

About one-quarter of this amount represents commissions received by stock and bond dealers, while most of the remaining three-quarters represents commissions received by real estate agents. The question whether these commissions should be treated as a special category of final output or as an offset to investment income has not, as yet, been decided for the *National Accounts*. A small amount of unallocated services of the chartered banks is also included.

#### (v) Imports of Goods and Services

The unallocated portion of imports of goods and services includes a very small amount of merchandise imports. An adjustment for freight and shipping charges paid to Canadian carriers for moving imported merchandise from point of shipment to the Canadian border, miscellaneous freight and shipping payments, an estimated portion of Canadian tourist expenditure abroad charged to business expense accounts, and the non-personal portion of the item miscellaneous current payments in the *Balance of Payments*.

## C. FINAL OUTPUT

The totals for each component of final output were derived from the *National Accounts*. The reader is referred to pages 103 to 115 of that publication for a description of the sources and methods used

in making the estimates. This Section describes only the additional steps that were required to translate the *National Accounts*' totals into an industry-of-origin classification.

# 1. Personal Expenditure on Consumer Goods and Services

These estimates were made under three broad categories: commodities, services, and net expenditures abroad.

## (a) Commodities

Two methods are available for estimating personal expenditure on commodities: (1) using retail sales data, and (2) the commodity flow method. Using the commodity flow method estimates are made by calculating the domestic disappearance of commodities produced in Canada or imported and applying to these figures the appropriate trade margins, transportation and storage costs, and indirect taxes in order to arrive at the price actually paid by the consumer<sup>32</sup>. Since the inter-industry flow table requires an industry-of-origin classification of personal expenditure, the commodity flow method seemed more appropriate. Another factor favouring the use of the commodity flow method was that the National Income Section (with a few exceptions) makes its estimates using retail sales data based on benchmarks obtained from the decennial Censuses of Distribution. Estimates made by the commodity flow method would therefore be useful to the National Income Section as an aid in assessing the reliability of their intracensal estimates.

The starting point in making the commodity flow estimates for 1949 was to assemble the data on commodities produced by each Canadian industry. These data are published in the following D.B.S. publications: *Handbook of Agricultural Statistics*, *Quarterly Bulletin of Agricultural Statistics*, *Fur Production*, and various other reports published by the Agriculture Division and the reports on the forestry, fishing, mining, quarrying, oil well, and manufacturing industries published by the Industry and Merchandising Division. The products of each industry were classified into the following groups:

(i) Finished goods of a type such that at least some of the output would probably have entered into personal expenditure.

(ii) Finished goods considered as capital goods in accordance with the definition of gross domestic investment used for the National Accounts.

(iii) Materials used principally for construction.

(iv) Materials used principally for packaging.

(v) Other materials for further processing or assembly into other products.

(vi) Other commodities which would be used only as current inputs into industry.

(vii) A group of commodities which were not described in sufficient detail to determine their probable use.

In some cases it was not possible to put a commodity exclusively into one of these groups. For example, an automobile, when purchased by an individual for his own use, becomes personal expenditure. On the other hand, if the automobile is purchased for use by a business firm, it becomes part of gross domestic investment. Commodities of this type were initially put into a "mixed" group and estimates made of the proportion which should be put into each of the groups listed above.

Consumer goods were further classified according to the channels of distribution through which they probably flowed to the final purchaser. Data collected in the 1951 Census of Distribution on commodity sales by various types of retail outlets were used for this purpose. (*Census of Canada, 1951*, Volume VIII, Table 12.) For example, although automotive chemicals and household soap are manufactured in the chemical products group, they are sold through different types of retail outlets and so were grouped separately in order that the proper wholesale and retail trade margin be applied to each. By this method commodity groups were set up in such a way that commodity flow estimates could be made using gross profit margin data that related to store types.

The estimation procedure then proceeded industry by industry. In most cases the original data were production figures; it was necessary, however, to arrive at the value of shipments from the industry. The change in inventories of finished goods of own manufacture was therefore applied to the production figure. A problem arose here because of the lack of commodity data. If an industry produces consumer goods, investment goods, and intermediate products, all three would be included in the inventory figure. To arrive at the amount that represented consumer goods, the total inventory change was prorated according to the proportion in which the three types of goods were produced by the industry.

The next step was to subtract the use of consumer goods used by other industries and exports. For example, sugar, although classified as a consumer good in the above classification is also a material used in the confectionery industry. (The method of estimating the use by other industries and exports is explained in Sections B and C.) In some cases an adjustment was also made for the change in inventory of these products held by other industries. The confectionery industry, for example, may include in its raw material inventories sugar produced by the sugar refining industry. In most cases the figure for change in raw material inventories was prorated on the basis of the proportion in which various materials were used in that industry. The residual figure also obtained after these

32. A description of the commodity flow method as used by the National Income Division of the United States Department of Commerce is contained in *National Income, 1954 Edition: A Supplement to the Survey of Current Business* (Washington, 1954), pp. 103-115 and 128-133.



adjustments is shipments from the industry destined for personal consumption valued f.o.b. the producing plant and excluding excise taxes and duties. The manufacturers' sales tax and other excise taxes and duties were then estimated for each commodity.

In order to determine the wholesale and retail margins that should be applied to raise these values to the price actually paid by the consumer, it was necessary to estimate the percentage of shipments by manufacturers to various types of purchasers. Estimates were made of the proportion of manufacturers' sales directly to retailers and directly to persons and the residual amount was assumed to go to wholesalers.

In some cases an estimate for transportation costs from the manufacturer to the wholesaler was added where this cost did not seem to be included in the factory value nor in the wholesale gross profit margin. The next step was to estimate the value added at the wholesale level. An allowance had to be made at this stage for the disappearance of commodities into inventories at the wholesale level. Again the lack of commodity information on inventories held by wholesalers made this adjustment inexact. It was assumed that inventories at both the wholesale and retail levels were valued at cost although the practice might vary depending on individual accounting methods used by reporting establishments. To each commodity group was then applied the gross profit margin for the appropriate wholesale store type. An allowance was also made for the fact that sometimes more than one wholesaler handles the commodity before it is shipped to a retailer. The gross profit margins used were obtained in most cases from the biennial surveys of operating results and financial structure of retail establishments conducted by the Merchandising and Services Section of the Industry and Merchandising Division. (These data refer to relatively "pure" store types - stores which derived at least 80 per cent of their revenue from the sale of a particular group of commodities.) Data in the 1951 Census of Distribution were used to obtain estimates of the proportion of wholesale shipments directly to households. (*Census of Canada, 1951*, Volume VIII, Table 12.) The remainder was assumed to pass through retailers.

The next step was to estimate the value added at the retail level. Generally it was assumed that the cost of transporting goods from the wholesale to the retail level was included with the gross profit margin of the wholesaler or of the retailer. The figure for the total shipments to retailers was obtained by adding the estimate of shipments directly from manufacturer to retailer to the shipments from wholesaler to retailer. Again this figure was adjusted for change in inventories at the retail level. Because of the lack of commodity data the adjustment was again on a pro rata basis. Since separate gross profit margin figures were available for independent and chain stores, an attempt was made to determine what proportion of the commodity group flowed through each type of outlet. The gross profit margin for the appropriate retail store type

was then applied and added to this was an estimate of provincial and municipal sales taxes where applicable. The figure so obtained was an estimate of the amount of personal expenditure on consumer goods purchased from retail stores.

To these sales were added the direct sales of manufacturers and wholesalers to consumers and an amount added for estimates of municipal and provincial sales taxes.

From *Trade of Canada, 1949*, Volume III, data on merchandise imports were obtained and a procedure similar to that used in classifying domestic production was followed. Commodity flow estimates of personal expenditure on imported consumer goods were then made in a manner similar to those for domestically produced goods. The method by which the use of imported commodities by industries was established is described above. Because of the lack of information on the channels of distribution through which imported goods flow, it was assumed they followed the same wholesaler-retailer-purchaser channels as the similar domestically-produced goods. Estimates of customs duties, excise taxes, and provincial and municipal sales taxes were applied at the appropriate levels.

The estimates incorporated into the *National Accounts* for income-in-kind received by individuals were added to arrive at the total figure for personal expenditure on consumer goods.

When these figures had been obtained comparison was then made with the figures contained in Table 36 of the *National Accounts*. The figures obtained by the commodity flow method were then adjusted, as much as possible, to agree with the totals for various commodity groups shown in this table. In other words, the industry-of-origin classification was obtained from the commodity flow method while the totals were adjusted, where possible, to agree with the figures used in the *National Accounts*. To the extent a discrepancy still remained, it was included in the unallocated row with the opposite sign so that the total added to the published *National Accounts'* total.

#### (b) Services

The estimates of personal expenditure in Table 36 of the *National Accounts* were translated into an industry-of-origin classification. The sources and methods of the estimates are described on pp. 106-108 of the *National Accounts*.

#### (c) Net expenditure abroad

The expenditures of Canadian residents in foreign countries (less an adjustment for expenditure charged to business) is included in the row for imports. The expenditures of non-residents in Canada were not excluded from the above-mentioned estimates of personal expenditure on the output of the various industries and are, therefore, deducted in total in the unallocated row. These adjustments



also cover net private remittances to non-residents to correspond to the contra-entry in the balance of payments components. To the extent that gifts in kind sent abroad do not appear in retail sales an estimate of their value is included.

#### (d) Unallocated

The unallocated row of the personal expenditure on consumer goods and services includes the export adjustment (\$304 million purchases of non-residents in Canada) and a statistical discrepancy between the inter-industry flow figures and the *National Accounts* control totals.

### 2. Government Expenditure on Goods and Services

As was explained above, the final output sector "government expenditure on goods and services" is a consuming sector. It consists of the outlays of federal, provincial and municipal governments (including municipal school boards) for currently produced goods and services. The figures are obtained residually by eliminating other government expenditures or outlays which are not made directly to purchase new goods and services. Thus, subsidies, transfer payments to individuals and private non-commercial institutions, and transfers to other governments, losses of government owned enterprises, provisions for debt retirement, reserves, various bookkeeping adjustments, and purchases of land and used capital assets are excluded. The expenditure of the Post Office is classified as a government business enterprise and is included in the communication industry.

Government expenditure on goods and services includes both current expenditure and outlay on capital account for new buildings, highways, and so forth. Investment in inventories, (for example, stock piles of agriculture commodities by government agencies) are also included in government expenditure in goods and services.

The details of the various expenditures for current expenses are shown in quadrangle I of the inter-industry table in the industry in which the particular government establishment was classified. The final output sector for government expenditure on goods and services is shown as purchasing an amount of output of these establishments equal to their net expenditure on current account. Capital expenditure included in this final output sector is shown as having been purchased directly from the industry which produced the capital goods.

#### (a) Current expenditure

The final output sector "government expenditure on goods and services" is shown as having purchased all the output of the government service industry plus those portions of the output of the transportation, communication, wholesale trade and community service industries which were produced by establishments whose expenditure is included in "government expenditure on goods and services" in the *National Accounts*. In the case of the Cana-

dian Broadcasting Corporation however, its output is split into two parts: (i) advertising revenue, which is treated as a sale to the business service industry, and (ii) the portion of its expenditure which is not covered by advertising and which is shown as if it were sold to the final output sector "government expenditure on goods and services". The method by which the various output figures were arrived at is described in the section on intermediate input.

#### (b) Capital expenditure

The totals for capital expenditure were obtained from Department of Trade and Commerce, *Private and Public Investment in Canada, Outlook 1951*. Since all construction is assumed to have been put in place by construction industry, capital expenditure on new construction is shown as being purchased from the construction industry. To obtain an industry-of-origin classification of capital expenditure on machinery and equipment, the *Public Accounts* were examined and estimates made of the types of machinery and equipment on which the expenditure was made. Data on the production of Canadian industries and on merchandise imports were then examined and estimates made of the amounts that came from various industries or were imported. From Table 3 of D.B.S. Reference Paper 39, *Government Transactions Related to the National Accounts, 1926-1951*, an estimate for the increase in inventories of government commodity agencies was obtained. On the basis of the agency holding the inventory, estimates were made of the industry of origin of the various commodities.

### 3. Gross Domestic Investment

Gross domestic investment, as defined for the *National Accounts*, includes expenditure for new machinery and equipment, new construction, and the change in inventories of private and government business enterprises and private non-commercial institutions. Expenditures of persons for new housing (including major improvements and alterations) are also included since home-owners are treated as business enterprises. Investment (including investment in inventories) by government departments is included with the total of government expenditure on goods and services.

Estimates of investment in new construction and new machinery and equipment are on a "gross" basis; that is, no allowances for depreciation or obsolescence of existing capital facilities have been deducted. Only new construction and new machinery and equipment are included. Purchases of land, used buildings, and second-hand machinery and equipment are excluded since they do not represent current production of goods and services.

Replacements and major alterations are treated as investment, but ordinary repair and maintenance expenditures are not. The theoretical distinction between capital and current outlays broadly resembles that adopted for the purpose of measuring net



income for income tax purposes. Certain expenditures, however, which may be treated by business as current operating expenses (such as office furniture and equipment and small tools) are included here as "capital outlay charged to current expenses".

**(a) Gross domestic investment in new construction**

The figure for gross domestic investment in construction is obtained from the *National Accounts*. Since all construction was assumed to have been put in place by the construction industry, this amount is shown in the inter-industry flow table as having been purchased from the construction industry. All other items in the gross domestic investment (excluding inventories) column of the table refer, therefore, to gross domestic investment in new machinery and equipment.

**(b) Gross domestic investment in new machinery and equipment**

The industry-of-origin estimates of gross domestic investment in new machinery and equipment were made by the commodity flow method. As explained in the section on personal expenditure on consumer goods, for each industry, goods which would be considered as capital goods, in accordance with the above definition of gross domestic investment, were grouped together. From the total for each industry was subtracted the amount of these commodities exported and the amount which was included in the item "government expenditure on goods and services". (Before subtracting these two items the estimates in purchasers' prices which had been made were converted into producers' prices. That is, estimates of transportation, trade margins and indirect taxes, if any, were deducted from the price paid by the user of these capital goods.) From this residual estimate of the production of new machinery and equipment was subtracted the change in inventories of machinery and equipment held by the manufacturers of these goods. The only data available were estimates of the total change in inventories of manufacturers' finished goods. To obtain the new machinery and equipment portion the total change was prorated according to the relative quantities of the various types of the commodities produced in that industry.

Where applicable, excise taxes were then applied to the value in shipments of new machinery and equipment. Estimates were then made of the percentage of shipments by manufacturers to wholesalers, to retailers, and directly to other industrial users and estimates were added for transportation costs incurred in shipping the item from the manufacturer to the distributor. An allowance had to be made to this stage for the disappearance of commodities into inventories at the wholesale level. Again the lack of commodity information on inventories held by wholesalers made this adjustment inexact. It was assumed that inventories at both the wholesale and retail levels were valued at cost although the practice might vary depending on individual accounting methods used by recording

establishments. Where machinery and equipment was assumed to have been sold to the user by a wholesaler, the wholesale gross profit margin for the type of wholesale establishment, through which the particular group of machinery and equipment items would have passed, was added.

From data in the 1951 Census of Distribution, estimates were obtained of the percentage of wholesale shipments to retailers, and the percentage directly to industrial users. An adjustment was made for change in inventories of retailers. To the portion that was assumed to have passed to a retailer was added the retail gross profit margin for the type of store through which the machinery and equipment would have passed. Where applicable, provincial and municipal sales taxes were added to this level.

From *Trade of Canada, 1949, Volume III*, data on merchandise imports were obtained and a procedure similar to that used in classifying domestic production was followed. Commodity flow estimates of investment expenditure on imported machinery and equipment were then made in a manner similar to those for domestically produced goods. Because of the lack of information on the channels of distribution through which imported goods flow, it was assumed they followed the same wholesaler-retailer-purchaser channels as the similar domestically-produced goods. Estimates of custom duties, excise taxes, and provincial and municipal sales taxes were applied at the appropriate levels.

The total estimate of gross domestic investment in machinery and equipment obtained from this method differed from the estimate in the *National Accounts*. The latter figure was accepted as correct and a pro rata adjustment made to the industry-of-origin estimates.

**(c) Gross domestic investment in inventories**

The net change during the year of business holdings of inventories must be included in the inter-industry flow table (at the value of the physical change rather than the change in book values) in order to allow for that portion of current production which has not yet been sold or to deduct that portion of the production of earlier years which has been included in this year's inputs into industry or in this year's expenditure by final output sectors. These changes in inventories represent net investment or disinvestment by private business and government business enterprises. Investment in inventories by various government commodity agencies is included with government expenditure on goods and services.

At present, for the 1949 figures in the *National Accounts*, only the change in inventories held on farms and grain in commercial channels was computed using the physical change of inventories valued at year-end prices, except for grain in commercial channels which is valued at average annual prices. For all other inventories, the change in inventories was calculated by taking the difference



between the year-end book values of inventory holdings by industry. These year-end values generally contain a different price element than that relevant for the measurement of the value of physical change and consequently a valuation and adjustment is in order. Such an adjustment is made for National Accounting purposes following the computation of the constant dollar estimate of gross national expenditure. These estimates are described on page 127 of the *National Accounts*. From the worksheets of the National Income Section estimates were therefore constructed for the value of the physical change in inventories for each industry (except agriculture).

The entry in the inventory column and the row of the inter-industry flow table for a particular industry should show that part of the output of the particular industry in 1949 which represented the total change in the stocks of the commodities produced by that industry, regardless of who owned the inventory. This may include items owned by manufacturers, retailers, or wholesalers. It may include finished goods inventories, raw materials, or trading inventories of manufacturers. Thus, for the inter-industry flow table an attempt had to be made to take apart the figures for inventories owned by various industries and put them together by adding the commodities produced by the same industry.

The procedure followed was to first make estimates of the change in book values of inventories, and then to make estimates of the inventory valuation adjustment by industry. When the two figures were added together, the resulting figure was an estimate of the value of the physical change in the inventories produced by each industry. An industry-of-origin breakdown of raw material inventories was made by prorating raw material inventories according to the industry-of-origin of materials used in the industry. The inventories of wholesale and retail trade were converted to an industry-of-origin classification on the basis of the principal commodities sold by the type of store holding the inventory.

#### 4. Exports of Goods and Services

Since the inter-industry flow table measures the domestic, rather than the national product, the figure for exports of goods and services in the *National Accounts*, \$4,011 million, was reduced by the amount of interest and dividends received from abroad, \$83 million, to obtain the total export of goods and services produced in Canada, \$3,928 million. The figure in the *National Accounts* differs from the \$4,089 million published in the *Canadian Balance of International Payments in the Post-War Years, 1946-1952* by the amount of inheritances and immigrants' funds received from abroad, \$66 million, which are treated as capital transactions in the *National Accounts*. (See Table 42 of the *National Accounts*.) There is also a statistical discrepancy of \$12 million because of a revision in the *Balance of International Payments* not yet incorporated into the *National Accounts*.

#### (a) Merchandise exports

From D.B.S. *The Canadian Balance of International Payments in the Post-War Years, 1946-1952*, and D.B.S. *Review of Foreign Trade, Calendar Year, 1951*, Table II, the following control total for the inter-industry flow study was obtained:

Merchandise exports (adjusted).....	\$2,989 million
Gold production available for export .....	139
Freight and shipping on merchandise exports .....	140
	<u>\$3,268 million</u>

A statement on p. 71 of the *Balance of International Payments* reconciles the *Trade of Canada, 1949* total of \$3,022 million to the \$2,989 million total of the *Balance of International Payments*. Data on the commodity detail of merchandise exports are published in *Trade of Canada*, Volume II. By comparing export statistics with data on commodity production obtained from the Agriculture and Industry and Merchandising Divisions, it was possible to establish the industry producing the exported commodity. If the item was produced in two or more industries, the principal producer was assumed to have been the exporter. In cases, however, where there were two or more major producers, the exports were prorated among them according to the value of production. The number of such cases were very small since the industry groups were chosen so that in most cases all industries producing the same commodity were grouped together.

For the inter-industry flow study commodity detail from Newfoundland's balance of payments for the first quarter were incorporated. Exports to Newfoundland from Canada were excluded and and exports of Newfoundland to other countries included. An adjustment was made in the unallocated row to make the total add to the 1949 National Accounts total. This adjustment for Newfoundland exports was made since production statistics for 1949 generally included Newfoundland for the full twelve months.

The export figures in *Trade of Canada* are valued f.o.b. point of shipment. For the inter-industry flow table these figures were raised to the value f.o.b. final port of shipment. From the balance of payments data was obtained the total of such transportation and other costs, \$140 million. Data on the transportation costs of wheat were already available; the remainder was broken down by industry according to the character of the goods, data collected by ports, etc.

#### (b) Exports of services

A small amount of the remaining \$163 million of freight and shipping receipts was estimated as being the use of imported supplies for foreign ships and shown as a re-export. The balance was shown as an export of the transportation, storage, and trade group. Travel expenditure was included in the unallocated row since an industry breakdown of this expenditure was not available. As explained above, interest and dividends received from abroad



were excluded to conform with the domestic production concept. The remaining current exports are in the unallocated row because of lack of data on their industry of origin.

#### D. PRIMARY INPUT

Tables 20-24 of the *National Accounts* provided control totals for the industrial distribution of wages, salaries and supplementary labour income, corporation profits before taxes, other investment income and the net income of unincorporated business. The sources and methods for those estimates are described in the *National Accounts* and will not be repeated here. These notes indicate the adjustments made to extend the distribution to forty-two industries and to adjust to input-output concepts.

##### 1. Wages, Salaries and Supplementary Labour Income

Estimates of labour income are designed to include all compensation to wage earners and salaried employees in Canada, including income in kind such as board and lodging. They do not include the earnings of self-employed individuals or partners, the income of independent professionals, the income of farmers, or payments to members of the armed services. (Payments to members of armed services are, however, included in the inter-industry flow table in the wages and salaries paid in the government service industry.) Wages and salaries are estimated on a gross basis; that is, they are calculated before tax deductions, contributions of employees to unemployment insurance pension, and to the social security schemes. Bonuses, commissions, and retroactive wage increases are included in the year in which they were paid.

Supplementary labour income consists of other expenditures by employers on labour account that can be regarded as payment for employees' services. Included here are employers' contributions to pension and employee welfare funds, unemployment insurance fund and workmen's compensation funds.

Where possible the industrial distribution of wages, salaries and supplementary income, government establishments are classified according to the Standard Industrial Classification whereas in the *National Accounts* they are all classified in Government. Thus, the figures in the inter-industry flow table differ from the industrial distribution in the *National Accounts* because of the classification of the following establishments which are in Government in the *National Accounts*:

Community Service:	Hospitals .....	\$ 53.9 million
	Municipal Schools .....	197.6
Communications:	C.B.C. ....	4.0
Transportation:	Dominion Government	
	Telegraphs .....	0.5
Wholesale Trade:	Crown Assets Disposal Corporation .....	0.6
		\$256.6 million

The adjustments for wages of labour force engaged in own account construction were based on the following sources:

(i) For manufacturing industries the Census of Industry collects data on wages paid to own labour force on account of new construction. The ratio of wages to value of new construction put in place was used to estimate wages paid on account of repair construction.

(ii) For steam and electric railways, telephone companies, and government, data published in *The Construction Industry in Canada, 1949* were utilized.

(iii) For waterworks an adjustment was made on the basis of data collected in the 1951 survey of capital expenditure.

(iv) A correction was made to public utilities estimate to incorporate a recent upward revision made by the Transportation and Public Utilities Section.

The additional adjustment for gas manufacture and distribution establishments was made on the basis of data collected by the Census of Industry.

##### 2. Corporation Profits, Other Investment Income, and Depreciation Allowances and Similar Business Costs

The concept of profits before tax used in the *National Accounts* differs somewhat from the one employed by the Department of National Revenue for taxation purposes. Adjustments are therefore made to the figures reported to the Department of National Revenue in order to bring them into line with the definitions required for the *National Accounts*. Thus, depletion charges which are deducted for income tax purposes are added back since discoveries of new natural resources are not capitalized and are therefore not counted as part of domestic investment and profits. The exhaustion of natural resources is not regarded as a charge against the national income. Charitable contributions made by corporations, also deductible as an expense under income tax regulations, are added on the grounds that they are not a direct cost of production but merely a distribution of earnings. Under Canadian income tax regulations, taxable profits calculated before payment of dividends do not include dividends received from Canadian corporations. No adjustments is required therefore to eliminate the double counting of dividends received by Canadian corporations from Canadian corporations. Foreign dividends received were excluded from profits for the inter-industry study since it is the domestic product that is being measured.

Allowances for current consumption of capital must be added to the factors of production in order to arrive at gross domestic product at market prices. Because of the difficulty of arriving at a figure of the true economic consumption of capital, it is necessary to use current accounting allowances for **depreciation, obsolescence, and amortization** as a basis for the estimate although these may vary widely from capital consumptions in the economic

sense. Since the gross domestic product at market price estimate is invariant to adjustments between profits and depreciation allowances, this difficulty does not affect the estimate for total gross domestic product.

In some cases, outlays which are essentially capital in nature are charged by business to current expenses. These outlays are included in the estimate of gross domestic investment and must, therefore, be included as a component of gross domestic product in order to preserve the balance of accounts. These outlays have therefore been added to the amount of depreciation allowances.

The claim portion of insurance against fire and other damage to business property (including all residential property) is regarded as similar to depreciation in that it is included in market prices but does not represent income of any factor of production and in that it is a cost of maintenance of the national capital. An estimate is also included for the claim portion of business insurance against financial loss (e.g., fidelity insurance).

Bad debt allowances (less recoveries) are also included as a business cost similar to depreciation because they enter into the market price of goods and services in gross domestic expenditure but do not represent income for any factor of production.

As is explained above, depletion charges are not included with depreciation.

**For the inter-industry study, corporation profits and other financial items, including depreciation allowances and similar business costs, were distributed on an establishment basis.** In the National Accounts they are on an enterprise basis. In adjusting corporation profits from an enterprise basis to an establishment basis large adjustments were made (i) for forestry, wood products, and pulp and paper; (ii) among the iron and steel, transportation equipment, and non-ferrous metal products groups; and (iii) between many industries and wholesale trade.

Three principal adjustments were made to data in *Taxation Statistics, 1951*: (i) for not fully tabulated companies and for calendar year, (ii) for differences between the National Revenue and the Standard Industrial Classification codes, and (iii) for conversion from an enterprise basis to an establishment basis.

The first step was to group the National Revenue sub-groups as closely as possible to the inter-industry study groupings. Totals on this basis were obtained for depreciation, profits, and other financial items. The adjustment for not fully tabulated companies was made for each group on the basis of the profits (or losses) of all companies versus the profits (or losses) of fully tabulated companies.

Adjustments for calendar year were based on card runs showing totals by broad industrial groups and by the month in which their fiscal year ended.

In order to obtain the detailed industry groups, it was assumed that the adjustments for each major group applied to each of the industry groups within the major group.

Adjustments were made for differences in coding. For example, the National Revenue code coded asphalt roofing companies under petroleum products while the Standard Industrial Classification coded them under paper products. In other cases, there were errors in coding. On the basis of available information, corrections were made for these coding differences and coding errors. (Recently the Department of National Revenue began coding according to the D.B.S. Standard Industrial Classification.)

The next step was to make the adjustments to convert from a company to an establishment basis for those companies which had establishments in more than one industry. The main source of information used for this purpose was a special card run prepared by the Labour and Prices Division from information on file at the Unemployment Insurance Commission. This card run grouped together all establishments under the same company, or, in some cases, under the same control. A card was made up for each company which had more than fifty employees in each of two or more industrial groups. (Information on the number of employees was listed on the card run.)

The number of manufacturing companies which had fifty or more employees in trade establishments was quite small, but a very large number had some employees engaged in trade. It did not appear that very useful results could be obtained if only the companies with fifty or more employees in trade were studied; while it would be impossible to study separately all the small companies. The *Census of Canada, 1951*, Volumes VII and VIII provided a different method of estimating the proportion of the profits of manufacturing companies which should be credited to trade establishments. In these volumes there is shown the wages and salaries paid by manufacturing companies to employees engaged in trade. These wages and salaries were compared with the total wages and salaries in manufacturing for 1951 obtained from Census of Industry manufacturing reports and the ratio obtained. This ratio was then multiplied by the 1949 profits of manufacturing corporations, giving an estimate of the profits to be transferred to trade. This was done separately for wholesale and retail trade, although the adjustment for retail trade was very small since there are few manufacturing companies engaged in retail trade. (Paint stores, for example, are classified in wholesale trade since most of their trade is with builders.) The same procedure was followed for depreciation.

For the adjustment between other industries, the companies operating in two or more groups with over fifty employees in each group were selected. On the basis of either gross value of production or employment, profits and depreciation were divided among the groups in which the company operated.



As originally planned, there was to be a much more elaborate method of estimation. The rate of profit on sales would be estimated for each industry group and this rate applied to the portion of sales of a company in each industry group to obtain an estimate of profits. These profit estimates, which would ordinarily total too high or too low, would then be adjusted to add up to the profits of the original company. This method was discarded for several reasons: (i) For groups such as paper products and forestry, no good rate of profit could be found for paper products, exclusive of forestry. (ii) For wholesale trade a different approach was used which by-passed the ordinary methods and made this step unnecessary. (iii) Where a company was engaged in service, finance, or some other group for which the Bureau does not have production figures, employment was used since this method did not apply.

After adjustments were made individually for the larger companies selected, an overall adjustment, based on a study made for 1946, was made. Companies which were treated individually were removed from the 1946 totals and a percentage adjustment made, based on wages and salaries of remaining companies. This adjustment was quite minor in scope because larger companies accounted for most of the adjustments.

The allocation of profits just described is obviously subject to considerable error. In particular, no allowance is made for cases where one establishment makes a profit and another establishment makes a loss. In cases where a paper products company owns and operates a forestry division, the profits earned in the forestry division depend on the price assigned to the pulpwood by the parent company. This may be a purely arbitrary price. The same applies to companies which mine, smelt, and manufacture non-ferrous metals and their products.

It may be, however, that as enterprises diversify their activities, changes in direction through time may occur even though the absolute differences are small. For example, some enterprises have establishments in both the textile and chemical products industries. Establishments in the textile industry could be making losses which are offset by profits of the establishments in the chemical industry. The effect of this would be lost in an enterprise distribution of profits. Unfortunately, however, the methods used at present in allocating profits on an establishment basis would probably not result in a loss being shown in the textile industry. This is one of the difficulties that must be overcome before a satisfactory establishment distribution of profits can be obtained.

The procedure described for profits also applied to other investment income (interest and net rental income of persons; and government investment income, including profits of government business enterprises) and depreciation allowances and similar business costs.

### 3. Net Income of Unincorporated Business

Net income of unincorporated business consists of accrued net income of farm operators from farm production together with the earnings of other working proprietors from their own businesses and income from independent professional practice. These earnings are accounted for separately in the *National Accounts* since they represent a mixture of labour income and investment income which cannot be segregated except on an arbitrary basis. To the extent that the working proprietors supply their own labour, they earn salaries and wages; to the extent that they supply their own capital, they earn profits, interests and rents.

This item is published by major groups in the *National Accounts*. The principal breakdown required was that for manufacturing. Data on gross value of production of unincorporated business (excluding co-operatives) were obtained from the Census of Industry and adjusted to include estimated receipts of unincorporated repair establishments. The net income of unincorporated manufacturing business was then distributed according to gross value of production. For other industries where industry groupings were finer than the published groupings, the National Income Section made estimates of the allocation of net income, based on Census employment data and other sources.

### 4. Inventory Valuation Adjustment

As was explained on page 15, inventories should be valued by multiplying the physical change by weighted average prices during the year rather than at book value. An adjustment was made in the table, therefore, to remove from profits any unrealized gains or losses on inventories which have occurred as a result of different methods of valuing inventories.

The figures for the inventory valuation adjustment were obtained from the National Income Section (see page 47). This adjustment is included in row 48 of the table ("other income").

### 5. Indirect Taxes and Subsidies

#### (a) Indirect taxes

Indirect taxes represent a part of the market price of goods and services which is not received by factors of production. All taxes which are deductible as expenses from the gross revenues of business are defined as indirect. Taxes which are levied directly on net incomes, whether as individuals or corporations, are regarded as direct taxes. (It would be desirable to separate taxes according to their ultimate incidence. If this were possible, those taxes which are shifted forward to the consumer would be treated as indirect, while those taxes which are not shifted forward would be treated as direct taxes. On the basis of present knowledge, separation according to the sources from which they were levied comes as close to the desired approach as is possible.)

Totals for the various types of taxes are published in Table 9, D.B.S. Reference Paper 39, *Government Transactions Related to the National Accounts, 1926-1951*. Further details on these taxes (on a fiscal year basis) are available in the Public Accounts of the various governments.

**(i) Customs import duties:**

By the same process that merchandise imports were allocated to the using industry, customs import duties were also allocated.

**(ii) Excise duties, excise taxes, gasoline taxes, and retail sales taxes:**

These taxes comprise part of the spread between producers' and purchasers' prices or are taxes on imported commodities. The taxes were therefore allocated to the industry producing the taxed commodities by the same methods that transportation and storage costs, trade margins, and other components of spread were allocated.

**(iii) Other indirect taxes:**

The taxes on banks and insurance companies and the amusement taxes could be allocated directly because of the nature of the tax. The manufacturing share of real and property taxes was allocated in accordance with the method for distributing miscellaneous intermediate input described on p. 39. The

portion paid by other industries was distributed on the basis of information published in various industry reports. An estimate of taxes on residential property was obtained from the National Income Section. Other taxes were allocated on the basis of available information.

**(b) Subsidies**

Subsidies represent amounts contributed by governments towards current costs of production. They must therefore be deducted from factor costs to arrive at gross domestic product at market prices.

Data on subsidies are published in Table 5 of D.B.S. Reference Paper 39, *Government Transactions Related to the National Accounts, 1926-1951*. Further details are also available in the Public Accounts of the various governments.

**(c) Unallocated taxes and subsidies**

About \$40 million of the unallocated indirect taxes and subsidies are taxes on commodities which should have been included in the spread between producers' and purchasers' prices or in the taxes on imported merchandise. The estimates of output of industries at purchasers' prices are therefore too low. The remainder refer to operating costs of business and would be included, at present, in the unallocated input into industries.



TABLE 1. The Inter-Industry Flow of Goods and Services, Canada, 1949  
(purchasers' prices in millions of dollars)

[illegible]

to construct all new and repair construction, including construction put in place by the labour force of other industries.

The construction sector includes all new and repair construction, including construction put in place by the federal government. All rented non-residential property and all residential dwellings, owned or rented, are included in this industry group.

The community, government, recreation, business, and personal service industries are included in this group.

The value of imports is estimated c.i.f. port of entry and the value of exports, f.o.b. port of exit.

An inventory valuation adjustment is included in this item.

Components may not add exactly to totals because of rounding or because of the residual error of estimate in the National Accounts (\$3.0 million).

Components may not add exactly to totals because of rounding in percentages and because some components may not be reported.





TABLE 2. Input into Each Industry per Dollar of Output of the Industry, Canada  
(purchasers' prices in dollars)

[illegible]

notes to Table 1.

For convenience in further computations, Table 2 gives more digits than are actually significant. Accuracy of individual ratios may be determined by making calculations from Table 1.





TABLE 3. Disposition of Output of Each Industry per Dollar of Output of the Industry, Canada, 1949  
(purchasers' prices in dollars)

[illegible]

See notes to Table 1.

For convenience in further computations Table 3 gives more digits than are actually significant. Accuracy of individual ratios may be determined by making calculations from Table 1.















